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NOTES ON NESTA (LAEVINESTA) ATLANTICA, A FLORIDAN FISSURELLID MOLLUSK

By HENRY A. PILSBRY and THOMAS L. McGINTY

In the course of dredging off Palm Beach, Florida, in Mr. Arthur R. Thompson's yacht *Triton*, the junior author with his brother, Paul L. McGinty, obtained a single living specimen of a mollusk quite new to us. The oval body was about an inch long, at least three times as large as the shell, and showed no shell externally. It was of a yellow color, and was brought up seated on a yellow sponge taken in 30 fathoms on a rocky reef, at *Triton* station 536. This animal was found to contain, wholly enclosed in the mantle, a shell shaped like that of the genus *Nesta* H. Adams, but smoother. This shell was described in Johnsonia II, p. 97, fig. 43, as *Nesta atlantica* Farfante.

The completely enclosed shell appears smooth to the eye, but under a lens a sculpture of close-set, very fine, rather indistinct radiating riblets is seen. There is no decussation, but some irregularly spaced weak lines of growth can be made out. Length 8 to 9.5 mm. A full description was given by Sra. Farfante.

At the time when we examined the preserved animal it had contracted to a length of about 15 mm., width 10 mm., and the color had changed to purplish black above, the foot a dull dusky reddish color. The foot tapers to a blunt end and projects a short distance behind the mantle, which appears smooth. Anteriorly the mantle is notched in the middle, thickened and lobed or digitated at the sides as in fig. 1C, but elsewhere is thin at the edge. It has no orifice over the shell, which could be felt through the mantle in the fresh animal. There is a short stout rostrum, a tentacle on each side of its base. No eyes were seen. Behind this tentacle there seems to be a slender process

perhaps a penis, and a rather large rounded epipodial lobe (fig. 1B). As the animal had been somewhat mutilated by the removal of the shell these notes will be subject to expansion and perhaps correction when other specimens are found.

The radula (fig. 1D) has numerous rows of 17 teeth each. Their arrangement may be expressed by a formula, thus: 1.3.414.3.1 (the central, lateral and marginal groups being here separated by periods).[1] The central field, occupying about one-fifth of the total width of the radula, has nearly uniform small teeth. The unpaired central tooth has a squarish basal plate a

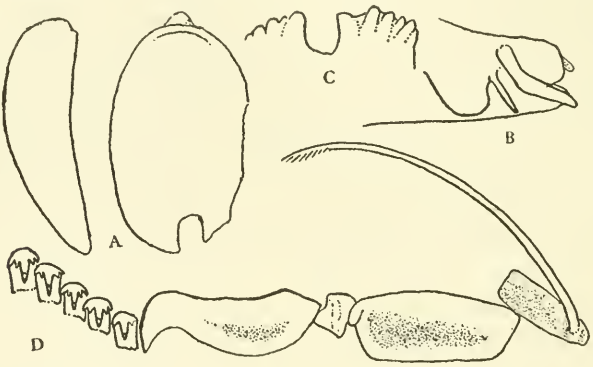

Fig. 1. *Nesta atlantica.* A, outlines of shell; B, head; C, anterior edge of mantle; D, half row of teeth.

little longer than wide, with a long middle cusp and two small side cusps, the outer one oblique. The four paired teeth of the central field on each side are similar to the central tooth but slightly asymmetric. Often one or two of the small cusps may be absent.

The lateral fields of the radula have three teeth. The very large inner lateral has an irregular elongate form with a large hooked cusp arising close to, but not quite at, its inner end (which does not show in the figure). The second lateral is small, of irregular shape, without cusp. It is usually partly concealed by the adjacent laterals. The third or outer lateral

[1] For notes on terminology of rhipidoglossate radulae see Baker, H. B., 1923, Proc. Acad. Nat. Sci. Phila., 75: 118. The three teeth here termed "laterals" appear to represent the A-central to the DE plates of Baker.

tooth is as large as the inner lateral, squarish, with a short nodule (scarcely to be called a cusp) at the inner anterior angle.

There is a single marginal tooth. Its long, slender, arcuate cusp, with delicately fringed end, arises from near the outer end of an opaque oblong basal plate. The slender shaft of the cusp has a rounded basal end and is apparently moveable on its basal plate. In the figure it is shown raised, but in resting position the feathered end lies over the inner lateral tooth.

The extraordinary feature of this radula is that the marginals, which are usually very numerous in rhipidoglossate radulae, are reduced to a single tooth on each side. The teeth of the central field have some resemblance to the so-called "innere Zwischenplatten" of *Clypidina noteta* (L.) as figured by Thiele, but the lateral and marginal teeth are very different. Unlike Emarginulinae, the centrals of *Nesta atlantica* are bilaterally symmetrical. In other genera having 414 teeth in the central field, the following lateral teeth are quite unlike those of *N. atlantica.*

The shell of *N. candida* H. Adams, the type species of *Nesta,* was apparently external, as its sculpture was thus described: *lirulis elevatis tenuissimis concentrice et radiantibus concinne decussata,* with the sulcus distinctly striate transversely and the margin delicately crenulate throughout. It is not likely that a shell so sculptured would be internal. We think that the Atlantic species will prove to be generically distinct from *Nesta* when that becomes more fully known, but at present we provide for it a subgenus LAEVINESTA, characterized by the wholly internal shell without concentric sculpture or marginal crenulation, and with the soft parts and radula as described above.

CILIARY FEEDING IN POMACEA PALUDOSA (SAY)

BY BERT M. JOHNSON

Mich. State Normal College, Ypsilanti, Michigan

The use of the foot in gastropods for purposes other than locomotion is rarely encountered. In observing the so-called "mystery" snail, *Pomacea* (*Ampullaria*) *paludosa* (Say) in my

aquarium of Scalares, the unique habit of ciliary feeding by means of the foot was noted on occasions when the snails were underfed. Shortly after sifting one-eighth of a teaspoon of pulverized dried crabmeat, shrimp and mosquito larvae on the surface of the water, these large snails crawled slowly up the glass wall, siphons greatly extended. Upon reaching the surface, the snails formed funnels with the anterior half of their prodigious feet. The anterior one-fourth of the foot was utilized to shape the cup and the succeeding one-fourth to form the tube. The remaining portion of the foot was flattened against the glass of the aquarium (fig. 1).

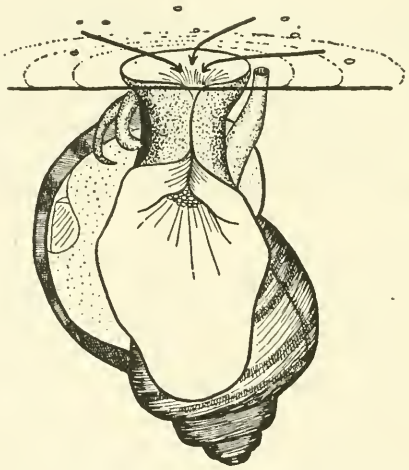

Fig. 1. Ciliary feeding of *Pomacea paludosa*.

The cilia of the ventral surface of the foot beat in such a rhythmical fashion so as to create a small current within the temporary funnel, sucking the particulate fishfood into the tube. The particles moved straight down the sides of the funnel, which indicates the direction of the beat of the cilia. The food particles traveled down the temporary pedal tube to the flattened region of the foot where they could be seen at the posterior opening of the funnel which was not completely constricted.

After completely filling the tube, each snail pushed its eager mouth over the rim of the funnel which slowly opened, revealing the contents. The food, adhering in a stringy mass by pedal

secretions, was then pulled into the mouth by the radula. The funnel-forming process was repeated as long as particulate food could be secured from the surface of the water.

Some snails assumed the funnel-shaping position away from the glass sides of the aquarium, supporting themselves by the extreme posterior portion of the foot on aquatic vegetation. The flattened portion of the foot was then free in the open water. The particulate food did not escape through the posterior orifice of the temporary funnel even in this position. Upon carefully examining the ventral surface of the foot and the movement of particles of debris in the water about it, no evidence of ciliary action in the flattened posterior regions was observed, indicating remarkable regional control and coordination of the pedal cilia.

Normally, *Pomacea paludosa* (Say) feeds like most aquatic snails, pushing the mouthparts along with palpal explorations until food is encountered and rasped into the mouth by the radula. Cook (1949) described a somewhat comparable ciliary feeding mechanism in *Viviparus viviparus,* a distantly related species.

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CARYCHIUM EXIGUUM (SAY) OF LOWER MICHIGAN; MORPHOLOGY, ECOLOGY, VARIATION AND LIFE HISTORY (GASTROPODA, PULMONATA)

By HAROLD W. HARRY [1]

This study concerns the general biology of *Carychium exiguum* in Lower Michigan. Special emphasis is placed on its morphology. Live specimens were collected from more than sixty localities in the state. Problems relating to collecting, culturing

[1] Abstract of thesis.

the snails in the laboratory and preserving material for morphological studies, as well as special techniques for studying *Carychium* are discussed. *Carychium exiguum* was found to have a short phenological period in July. Immature specimens were present in nature in quantities greater than ten per cent only until November. Darkness, constant high moisture and decaying vegetation appear to be the essential factors in their environment. *Carychium* occurs as isolated colonies in microhabitats which were found chiefly in *Thuja* forests, open grassy areas and some hardwood forests.

From a study of variation of the shell it was concluded that criteria previously used for distinguishing nominal species in this area are not sufficient for recognizing more than one natural species. No anatomical differentiation of species was found. Changes in the shell during growth are recorded. *Carychium,* unlike other Ellobiacea studied, showed no evidence of heterostrophy. Resorption of the internal partitions of the shell and perfection of the lamellae proceed with growth.

In the animal there is a fusion of the whorls of the visceral mass which corresponds to the amount of resorption of the shell partitions. This resorption process corresponds to the insertion of the columellar retractor muscle, the upper extent of the pulmonary cavity and, together with certain innate characteristics of the spire itself, helps delimit the apical portion of the spire as a unit, forming the upper visceral complex. That portion of the hemocoel connecting the upper visceral complex and the cephalopedal mass was found to be divided further into two longitudinal portions by the encroachment of the shell lamellae on the diaphragm.

In general, a simplification of structure was observed in the internal anatomy. This trend was especially noticeable in the reduction of branching of the ovotestis, liver and salivary glands. Musculature is present in the digestive tract only in the region of the stomach and buccal mass. In the circulatory system the heart is similar to that of other pulmonates, but in the arterial system only the rudiments of the major arteries were present. As the pulmonary vein lacks lateral branches, the pulmonary cavity is without a vascular network. There is a spacious marginal mantle sinus which seems to be the chief

site for external respiration. The left pallial vein conveys blood directly from that sinus to the pulmonary vein, joining it just before the latter empties into the auricle. The kidney is a simple sac lacking internal folds. No ureter is present.

The nervous system is more diffuse than in most other Pulmonata. There are two accessory cerebral ganglia which are not comparable to the tripartite cerebral ganglia of either *Helix* or *Lymnaea*. Chiastoneury is manifest in the visceral nerve ring, which contained pleural but not parietal ganglia. The sensory epithelia at the tip of the tentacles and margin of the labial palps were identical in structure. The latter may be homologous with the tentacular pads of the Ellobiidae or sensory areas in other Basommatophora.

Two sexual types were found, both containing sperm and ova in their gonad. The reproductive system of the aphallate type is characterized by a unifollicular gonad, the absence of a seminal vesicle, vas deferens and penis. The phallate specimens have a pleurifollicular gonad, a seminal vesicle, vas deferens and penis. A glandular organ was found which corresponds to the mantle organ Plate first described in *Pythia*. It contained a tube in phallate specimens which is lacking in the aphallate ones. A muscular and glandular modification of the parietal isthmian hemocoel in the phallate specimens is also lacking in the aphallate ones. The ratio of the two sexual types varies in different colonies.

This thesis was accepted in the fall of 1951 by the Graduate School of the University of Michigan, in partial fulfillment of the doctoral degree requirements. Microfilm of the thesis should be obtainable in the spring of 1952.

THE DUXBURY BAY 1950 SET OF MYA ARENARIA L.

By HENRY D. RUSSELL

From conversations with the shellfish officer and with those who have derived a substantial portion of their livelihood from the clamming industry of Duxbury Bay, Massachusetts, in the past, there evidently have been plentiful sets of the soft-shelled clam *Mya arenaria* here for the past several years. These

sets, however, persisted for only a few months and died without spawning. Thus they were not a contributory factor in rebuilding a clam population in the bay.

There was no available recorded information concerning the clam sets of the past few years; only the lack of *Mya arenaria* on the once plentifully producing flats provided mute evidence that they had not persisted. The purpose of this paper, therefore, is to place on record with a few environmental notes a brief history to the date of writing of the 1950 clam set. This history extends over a period of approximately five months from August 11, 1950 to January 18, 1951.

The Annual Duxbury Town Report for 1949 shows that in that year 129 bushels of seed clams were planted in the bay and these according to the shellfish officer were scattered between the Yacht Club and Standish Shore. The present clam set according to the latter source extends from the south side of Powder Point to Standish Shore.

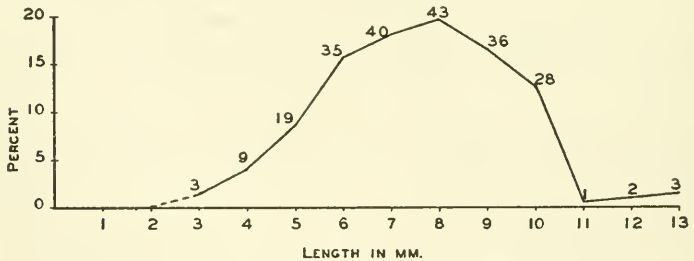


Fig. 1. Length groups of sample expressed in whole mm. Figures above points are actual numbers of individuals in each group.

The author located young clams attached by a byssal thread to the mooring lines, wharf pilings, and the under carriage of floats near the Yacht Club on August 11. These specimens were numerous and ranged in size from 1.6 to 6.5 mm. in length. On August 29 others were located attached to sand and *Ulva* sp. at low tide near South Duxbury. This location was directly westward of Little Mussel Bed, Mussel Bed and Round Flats.

Both of these collections were made within the area planted with seed clams during 1949. The environmental conditions were not investigated on August 11, but the following data

were recorded on August 29: water, pH-7.5; temperature, 24.0°C.; dissolved oxygen in parts per million, 9.41; current velocity, 1 foot per 7.5 seconds; salinity, 27.2 parts per mille.

No further collections were made until January 18, 1951. The site of this collection was at about the half tide mark at the William F. Clapp Laboratory, approximately 250 yards south of the Yacht Club. Here 219 seed clams were found in the upper 2 inches of the sand of a random square foot sample. These clams ranged in size from 3.4 to 13.5 mm. in length, with an average of 8.34 mm. In general the smaller specimens were found nearer the surface and all were attached to sand grains by the byssus. Some individuals as large as 12.5 mm. were seen attached to clumps of mussels, *Mytilus edulis,* lying on the surface of the sand near the square foot sample under investigation. The accompanying graph (fig 1) indicates the percentages of the various length groups of the sample expressed in whole millimeters, while the numbers at the various points on the face of the graph show the actual numbers of each length group.

The average length of those clams found in August was 4.0 mm. while that of the January sample was 8.3 mm., an increase of 4.3 mm. This increase indicates that this clam set had more than doubled its average length in the previous five month period, or that it had increased at a rate of 0.86 mm. per month. This appears to be a rather slower rate than usual. Belding, 1930,[1] states that the legal size (2 inches or 50 mm.) for a clam is reached in about 2 years in these waters. This is an average growth rate of about 2 mm. per month. This rate depends upon the abundance of food and such environmental factors as water temperature and currents.

The spawning period for *Mya arenaria* is considered to be from June 1 to August 31 (Belding, 1930). If this is the case, then the growth rate of this Duxbury set for the first 2½ months, June 1–August 11, was approximately 2 mm. per month. Its rate for the next five months was somewhat slowed down to average 0.86 mm. per month. However, for the whole growing period of the set, June 1 to January 18, the growth rate was approximately 1.5 mm. per month.

Mya arenaria grows at a slower rate during the winter months, November to April, than during the more active period,

May to November. The clams investigated in January were found in rather coarse sand and will probably show little increase in length, if they survive, until the next growing season. This reasoning is based upon the following statements from Belding (1930):[1] "It is interesting to compare the winter growth in sand and on mud flats, as observed at Plymouth harbor. The growth on Wind Flat (mud) from October to June was 12.72 millimeters or nearly one-half inch, while the growth of similar clams on White Flat (sand) during the same period was 4.92 millimeters or about one-fifth of an inch."

The seed clams collected in January appeared healthy and on tactile stimulation retracted the foot and siphons actively.

THE LAND SNAILS OF PITTSYLVANIA COUNTY, VIRGINIA

By LESLIE HUBRICHT

This paper is the third installment on the land snails of Pittsylvania County, Virginia. The first, on the Polygyridae, was published in The Nautilus, vol. 64, no. 1, July, 1950. The second, on the slugs, was published in vol. 65, no. 1, July, 1951. The present paper treats all of the remaining families except the Zonitidae. The Zonitidae, with approximately twenty species, will be treated later as the species become better understood.

Helicidae

Cepaea nemoralis (Linn.). Abundant on the northwest end of the block on the southeast side of South Main Street, between Paxton and Stokes Streets. Ignoring such minor variations as coalesced or imperfectly developed bands the 106 specimens collected may be sorted as follows: Pink 00000, 16; Yellow 00000, 1; Yellow 00300, 20; Yellow 00345, 7; Yellow 12345, 62.

[1] Belding, D. L. The soft-shelled clam fishery of Massachusetts. Dept. of Conservation of Mass., Marine Fisheries Series, No. 1, 1930.

Haplotrematidae

Haplotrema concavum (Say). Common over the county but most numerous and larger on the bluffs along the Dan and Roanoke Rivers.

Endodontidae

Anguispira alternata (Say). Common on the bluff along the Roanoke River.

Anguispira alternata form *angulata* Pilsbry. Found on the bluff along the Dan River but not common.

Anguispira fergusoni (Bland). Found in the floodplain of the Dan River in the extreme southeastern corner of the county. This coastal plain species wanders up the larger river valleys well into the Piedmont where it became smaller and high spired, approaching *A. clarki*. *A. fergusoni* is found in company with *A. alternata* form *angulata* along the lower Roanoke River and there is no intergradation. I believe that *A. alternata* is a complex of at least five species, *fergusoni, knoxensis, crassa,* and *mordax* being distinct, as they all have been found associated with *A. alternata*.

Discus patulus (Desh.). Common on the bluff along the Roanoke River from Smith Mtn. Gorge to Altavista. Many of the specimens found are albinos.

Helicodiscus parallelus (Say). Generally distributed over the county but not very common.

Punctum minutissimum (Lea). Known only from two specimens collected in the floodplain of the Dan River.

Punctum blandianum Pilsbry. Abundant in ravines and upland woods over the county. The second most abundant species.

Punctum vitreum H. B. Baker. Known only from four specimens collected on the bluff along the Roanoke River.

Punctum smithi Morrison. Generally distributed over the county. The most abundant species.

Punctum lamellatum Hubricht. Known only from the bluff along the Roanoke River, 3 miles northwest of Brights; and a ravine, just west of Schoolfield.

Succineidae

Succinea avara (Say). Known only from a few specimens found at scattered localities over the county.

Strobilopsidae

Strobilops labyrinthica (Say). Generally distributed but not common.

Strobilops aenea Pilsbry. Generally distributed but not common.

Pupillidae

Gastrocopta armifera (Say). Found on pieces of broken concrete on a vacant lot in Danville. It is probably introduced.

Gastrocopta contracta (Say). Found only in Danville.

Gastrocopta pentodon (Say). Known only from one locality, under logs along Riverside Drive, Danville.

Gastrocopta tappaniana (C. B. Adams). Known only from under logs in a swamp along Riverside Drive, Danville.

Gastrocopta procera (Gould). Found under pieces of broken concrete in Danville. It is probably introduced.

Pupoides albilabris (C. B. Adams). Found under pieces of broken concrete in Danville. Undoubtedly introduced.

Vertigo milium (Gould). Known only from under logs in a swamp along Riverside Drive, Danville.

Vertigo ovata (Say). Found associated with *V. milium.*

Vertigo oscariana Sterki. Found only at two localities: On the north side of White Oak Mtn., 2 miles north of Spring Garden; and oak woods, Schoolfield.

Columella edentula (Drap.). Found on the north side of White Oak Mtn., 2 miles north of Spring Garden; and on the bluff along the Roanoke River, opposite Altavista.

Valloniidae

Vallonia pulchella form *excentrica* Sterki. Found in vacant lots in Danville. Probably introduced.

CIONELLIDAE

Cionella lubrica morseana Doherty. Generally distributed and common. Unlike most small snails this species is not active during the winter. It is found under the leaves, rather than among them.

CARYCHIIDAE

Carychium exiguum (Say). Generally distributed in wet places. Not as common as the next species.

Carychium exile H. C. Lea. Generally distributed and common .

Carychium nannodes Clapp. Found on the bluff along the Roanoke River as far east as Staunton River State Park.

Carychium costatum Hubricht. Known from three specimens collected on the bluff along the Roanoke River, 3 miles northwest of Brights.

SOME LAND SHELLS FROM JAPAN AND THE MARITIME PROVINCE OF SIBERIA

BY WALTER J. EYERDAM

In September 1930 while visiting Tsuruga, Japan, I collected some of the beautiful large land snails in the genera *Euhadra* and *Ganesella* which live in leaf mould near the seashore. Some of the varieties in these two genera bear a striking resemblance to some of our forms of Monadenia. Dr. Cockerell had collected in the same locality around Tsuruga a few years before. Of the recently described varieties, I found several *Euhadra sandai* var. *okanoi* Pilsbry and Cockerell and *Euhadra peliomphala* var. *maculata* Pilsbry. This latter variety is not reported in Pilsbry's report on the Japanese *Euhadra* in "Review of Japanese Land Mollusks," II. All the land shells that I collected around Tsuruga were submitted to Dr. Pilsbry for identification, but none proved to be new on account of the thorough collecting made previously by Dr. Cockerell and his Japanese assistant Okanoi.

During a few days stop at Vladivostok in September 1928 before traveling to Manchuria, I made a couple of trips to the biological station which was situated on a small isthmus on one end of the Golden Horn. This bay upon which the rock bound city of Vladivostok is situated is an arm of the Gulf of Peter the Great. In an undisturbed spot in deep leaf mould under bushes, I found four live specimens of Cockerell's gigantic race of *Eulota maackii* Gerstfelt which he named var. *optima* Cockerell. His original find in 1923 was made at Kongaus a few miles east of Vladivostok. Measurements of the three adult specimens in my collection are the same as those of Cockerell which measure 33.5 to 34.5 mm. The fourth specimen not quite mature is about 5 mm. less in maximum diameter, but may not have reached the maximum size of the others when mature.

Two years later when I was again in Vladivostok on my way to Germany after leaving the Whitney South Sea Expedition in Papua, I started on a hike over to the biological station, but during these two years a great change had come over all of the vast Soviet empire through Stalin's overall rapid development of the first five year plan. Vladivostok had already taken on a new look as was the case in nearly every city in U.S.S.R. The Golden Horn was full of ships and new fortifications were being built. The isthmus where the biological station stood was bristling with batteries and was a new naval base. No civilians could come near the spot where I had found the giant race of *Eulota maackii.*

At the university of Tomsk in western Siberia I received from the young biologist Bodo Johannsen, son of the well known ornithologist Prof. Hermann Johannsen, two specimens of *Eulota maackii* from near the type locality where R. Maack collected this species in the middle of the last century. These gift specimens were collected by Prof. Korzhinsky in 1891 in a deciduous forest at the lower falls of the Kura River in the Amur province. They are less than half the size of Cockerell's giant race, collected in 1923.

The typical *Eulota maackii* is found over a wide area from the Amur River and south for over 400 miles. The giant race living in the vicinity of Vladivostok on the south end of the area probably extends into nearby north Korea and eastern Man-

churia, both countries being only about fifty miles from Vladivostok. About 150 miles north of this city, in the Turi Rog or Hanka Lake, lives the largest freshwater mussel in the world. It is *Anodonta herculea*. I have seen one that was fully 12 inches long. That corner of East Siberia and Manchuria supports and exceedingly interesting endemic or relict flora and fauna.

THE SHELLS OF PYRAMID LAKE, NEVADA

By MORRIS K. JACOBSON

On August 21, 1947 I collected a large series of aquatic shells on the western shore of Pyramid Lake, the exact spot, as it later developed in the course of a short correspondence, where the Bailys made their collection. The day was blustery and squally and a brisk wind blowing from the farther shore deposited huge windrows of dead shells all along the area I was visiting. Hence, it was the work of a moment to secure a large collection. On the basis of the material thus obtained I feel it might be pertinent to add a few comments to the excellent paper on this fauna prepared by Joshua L. and Rüth Ingersoll Baily (Nautilus, 65: 46–53, 85–93, Pl. 4).

Dr. and Mrs. Baily report the following species from Pyramid Lake: *Pyrgulopsis nevadensis* Stearns, *P. nevadensis paiutica* Baily & Baily, *Parapholyx effusa nevadensis* Henderson (or *P. effusa solida* Dall), *Helisoma tenue* Dunker, *Physa lordi utahensis* Clench, *P. lordi zomos* Baily & Baily. To this list I would add *Carinifex newberryi* Lea, *Gyraulus similaris* F. C. Baker and *Anodonta* species (*A. nuttalliana* Lea?). I found *Carinifex* not at all uncommon, approximately in the same numbers as *Helisoma tenue*. Many specimens are more than one-half inch in diameter and in beautiful condition. Hence I must report that my experience differs decidedly from that of the Bailys (Nautilus, 63: 76). Of the *Gyraulus* I found 18 individuals by actual count, but so far have subjected only about two-thirds of the material to minute examination. The *Anodonta* appears only in the form of weathered, flaking fragments, none showing even a vestige of the hinge area.

In connection with the subspecies *paiutica* of *Pyrgulopsis nevadensis*—the taxonomic value of which the authors themselves say "is somewhat problematical"—it might be of value to cite a paper by A. E. Boycott on "The Inheritance of Ornamentation in var. *aculeata* of *Hydrobia jenksini* Smith" (1929, Proc. Mal. Soc. Lond., 18: 230 ff.), a not distantly related species. The following quotations are of particular applicability to the present case: "The keel and spines of the parents do not under these [experimental] conditions reappear in the young"; "Carinated young transferred to good conditions produced only smooth progeny" (p. 232); "These results show that aculeation is not in the ordinary sense a heritable character. They confirm those of Robson (1926, Brit. Jour. Exp. Biol., III: 149) who obtained nothing but smooth young from carinated parents." Boycott believes that transference to "bad" conditions seems to bring about carination. This coincides well with the fact that carinated *Pyrgulopsis* appear in tremendous excess over the smooth forms in Pyramid Lake, a body of water that presented the characteristics, as evaporation induced increasing salinity, of progressively worsening conditions from the point of view of fresh water mollusks. At any rate, if the results obtained by Boycott and Robson with *Hydrobia jenksini* can be repeated with *Pyrgulopsis nevadensis*—a very likely conjecture—then it would appear that the nomenclatorial validity of *paiutica,* except as a simple variational form, is further weakened.

Similarly I must with reluctance express some doubt as to the validity of *Physa lordi zomos.* Judging by the well executed figures on page 91 (Naut., 65), which present the typical and the two "subspecies" of *P. lordi,* I find that I can easily produce specimens from among the Pyramid Lake physas that conform to each of these forms. Here again we seem to be dealing with simple variational forms which intergrade so well that many specimens can be assigned only with difficulty. What the Bailys write about the supposed subspecies of *Parapholyx effusa* (op. cit., p. 86), applies very well to those *Physa lordi:* "In a long series of these shells from Pyramid Lake the observable variation appears to efface the supposed differences among the forms mentioned above." One would judge that

zomos had better remained unnamed where many students had left it.

A NEW SUBSPECIES OF PECTEN (PLAGIOCTENIUM) GIBBUS (LINNÉ)

By GILBERT GRAU

Several years ago a number of specimens of *Pecten gibbus* were received from Mr. R. C. Spencer, who had collected them 2 miles off Port Royal, South Carolina. It was immediately apparent that they differed considerably from typical *gibbus* but it was felt advisable to secure more examples of the form before attempting to arrive at any conclusion regarding its status. As the result of subsequent collecting by Mr. Spencer in the same area more than 60 specimens have been received, ranging in height from 7 to 33 mm.

For comparative study the author used a series of 104 specimens of *P. gibbus* in his collection, ranging from 10 to 51 mm. in height and collected at various localities on the east and west coasts of Florida, at Campeche, Yucatan, and at Gambia, west Africa. Thorough comparison of this series with the South Carolina series proved the latter to be quite distinct and readily separable from the typical.

A somewhat similar fossil species, *P.* (*Plagioctenium*) *comparilis jacksonensis* Mansfield (Upper Miocene of Florida), was also compared with the Carolina specimens and was found to differ in a number of respects.

Having completed the foregoing study, the author is convinced that the South Carolina form is deserving of subspecific rank, and a description of the new subspecies follows.

Pecten (Plagioctenium) gibbus carolinensis subsp. nov. Plate 1, figs. 2, 3, 4, 5, 7.

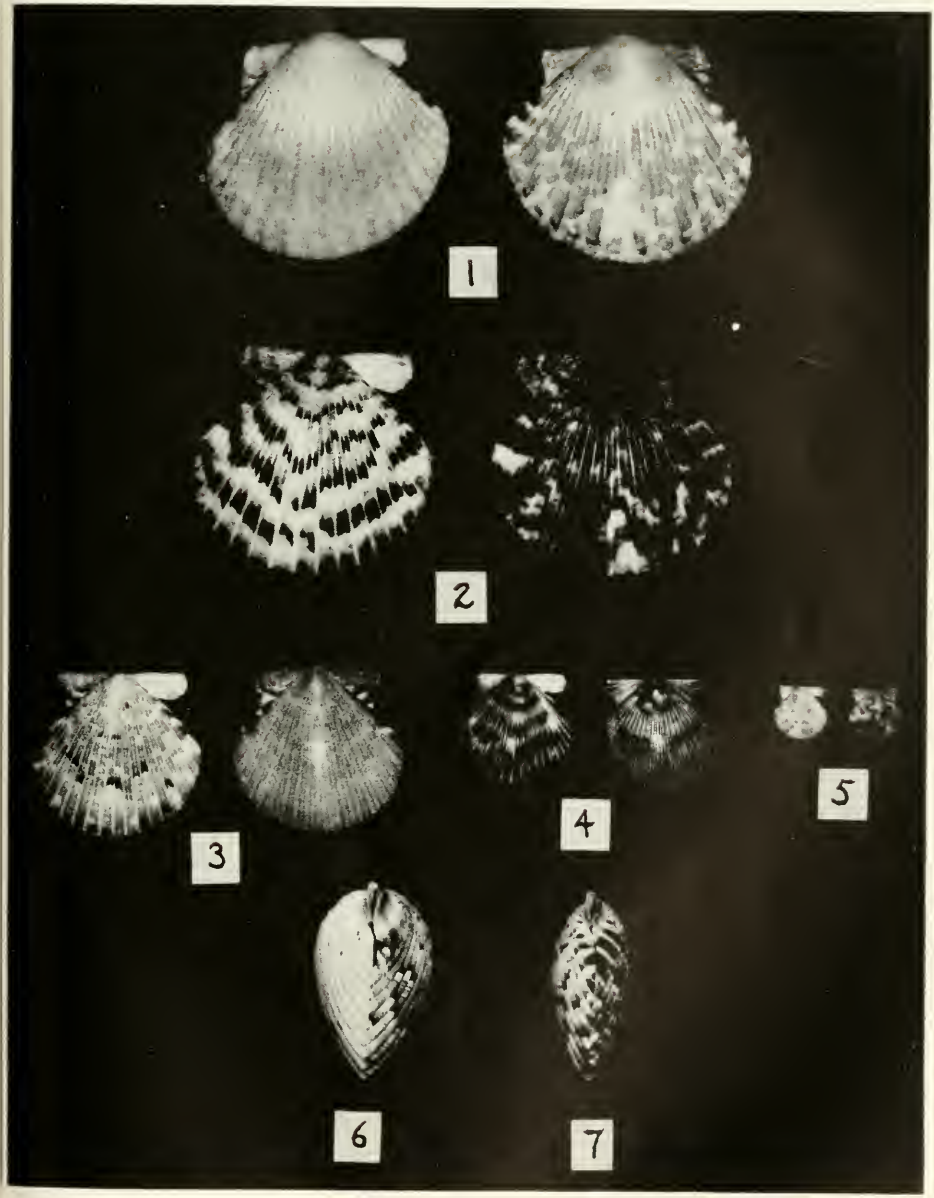
Shell of moderate size, equilateral, equivalve and moderately convex, with fairly long hinge line. Anterior auricle of right valve rather strongly produced and having 4 riblets. Fine concentric lamellae in interspaces and crossing riblets, often producing scales on apexes. Distinct byssal sinus and ctenolium

consisting of 5 or 6 teeth. Posterior auricle moderately produced and having 6 or 7 riblets. Fine lamellae in interspaces of young shells; in larger specimens lamellae cross riblets but do not form scales. External hinge margin of right valve irregularly scaled, but not prominently. Anterior and posterior auricles of left valve having 5 to 7 riblets; concentrically lamellated but not scaled. Disc of both valves having 18 to 21 ribs. On right valve ribs are rather broad and rounded, with distinct concentric lamellae (much stronger than on auricles) in interspaces. Ribs on left valve narrower, steeply rising and somewhat flattened on top. Intercostal lamellae more numerous than on right valve, and in juvenile specimens present in interspaces only. As shell reaches altitude of 20 to 24 mm. lamellae continue across ribs. Umbones not gibbous, tapering to point and, in left valve only, projecting slightly over hinge line. Coloration: left valve ranging from reddish brown to pale brown, variously mottled with white and deep brown. Right valve paler and often predominantly white; mottled with colors corresponding to those of left valve; anterior auricle always white.

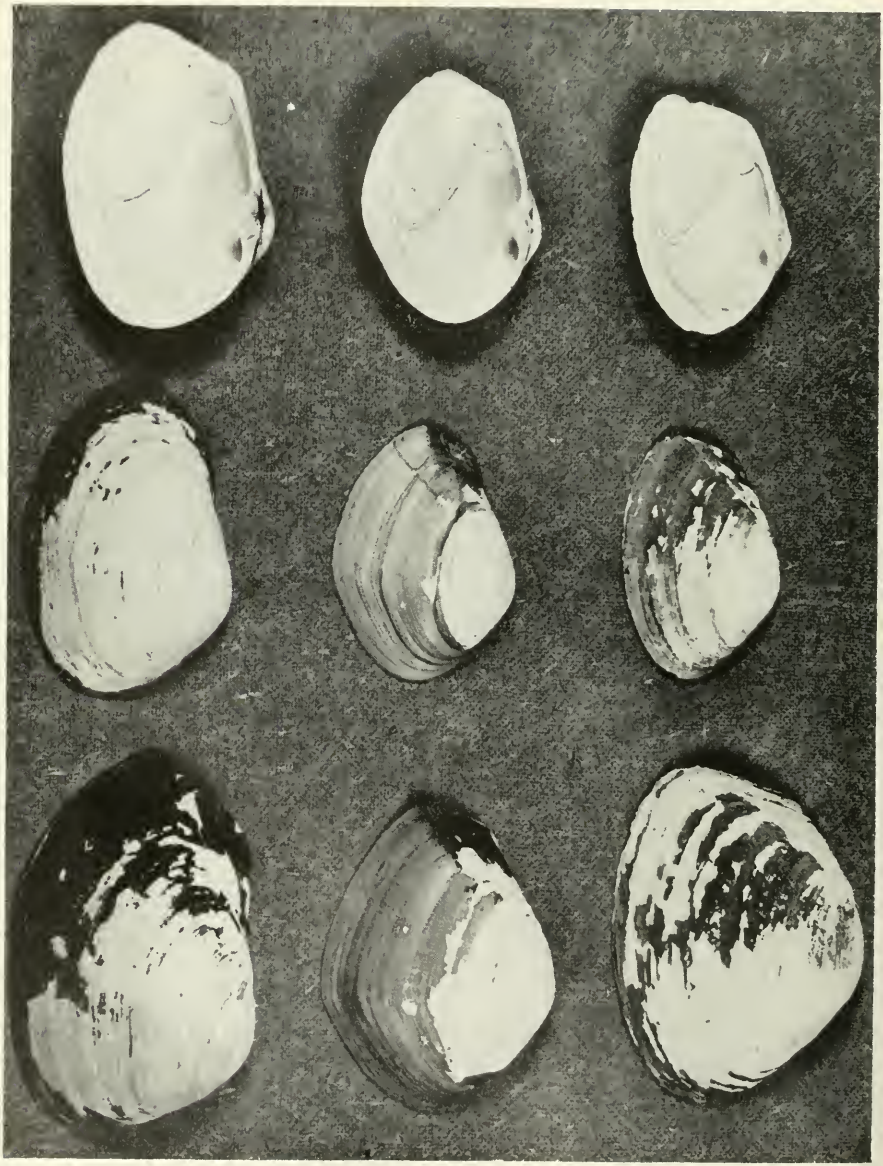
The holotype, in the author's collection, was taken at a depth of 80 feet, 2 miles off Port Royal, South Carolina, by Mr. R. C. Spencer. It measures: height 33 mm.; length 34 mm.; diameter 14 mm. Paratypes have been deposited in the United States National Museum and the California Academy of Sciences, San Francisco.

The subspecies is easily distinguishable from typical *gibbus,* the following constant features being the chief differences: valves much less convex, interspaces distinctly lamellated, byssal and posterior sinus pronounced and umbones pointed and not inflated. As an indication of relative tumidity (the most immediately apparent distinction) an average specimen of *P. gibbus* measuring 33 mm. in height, has a diameter of 19.5 mm., while the holotype of the subspecies, of the same height, has a diameter of only 14 mm.

The author is grateful to Mr. Spencer for so generously supplying specimens, to Mr. Herman Gunter, of the Florida Geological Survey, for the loan of fossil material, and, in connection with research in general on the family Pectinidae, to Mr.



FIGS. 1, 6, *Pecten gibbus* L., FIGS. 2, 3, 4, 5, 7, *Pecten gibbus carolinensis* Grau.



Top row: *Schizothaerus keenae* Kuroda and Habe from Japan. Specimens furnished by Dr. Iwao Taki of Hiroshima University. Middle row: *S. capax* (Gould), San Juan Island, Washington. Bottom row: *S. nuttallii* (Conrad), Orcas Island, Washington.

Living horse clams, tipped to show siphonal plates. *S. capax* (Gould) above: *S. nuttallii* (Conrad) below.

Preserved horse clams. *S. capax* (Gould) above:
S. nuttallii (Conrad) below.

Leo G. Hertlein of the California Academy of Sciences, who has, for several years, given assistance and advice of immeasurable value.

OBSERVATIONS ON THE GENUS SCHIZOTHAERUS

By EMERY F. SWAN and JOHN H. FINUCANE

Friday Harbor Laboratories and School of Fisheries, University of Washington, Friday Harbor and Seattle, Washington

Introduction

In the spring of 1949, the senior author made a trip to Crescent Beach on Ship Bay at the head of East Sound, Orcas Island, Washington (Latitude 48°41′42″ N., Longitude 122°53′ 18″ W.) for the purpose of learning the suitability of that place for intertidal study by his class in invertebrate zoölogy. While there he met Mr. Wesley Langell, a long time resident of Orcas Island, on the beach. Mr. Langell stated that two kinds of horse clams lived in the beach, one good eating and the other not worth bothering with. The good ones, he pointed out, usually had large barnacles on the siphonal plates, whereas the worthless ones did not. At the time the writer was not much impressed, but by the next spring he realized that these two kinds of horse clams were probably what zoologists have called *Schizothaerus nuttallii nuttallii* (Conrad) *Schizothaerus nuttallii capax* (Gould) or *S. capax* (Gould) as a full and separate species. Hence in the spring of 1950 he arranged to meet Mr. Langell again on the same beach on a good "clam tide." Upon the senior author's arrival there, Mr. Langell's first comment was that the good clams were all gone and must have been frozen out. In digging several dozen *Schizothaerus,* neither of us found a single living specimen of the "good" horse clam. Several were found so recently dead that the decaying bodies were still within the shells. They proved to be the form *S. n. nuttallii.* No recently dead *S. capax* were found, although living ones and old empty shells were numerous. The writer learned that the periostracum of the siphons of *S. n. nuttallii* is so much lighter in color, especially toward the shell, that the clam diggers on that beach term these clams "herefords" in

contrast with the less desirable *S. capax* which are refrred to as "horse clams."

Later in 1950 by means of the barnacle-on-siphonal-plate method, the senior author located living *S. n. nuttallii* on shores having muddier soils and more direct access to the waters of the main channels of the region than was the case at Crescent Beach. Although no statistical studies were made either before or after the winter 1949–50, there appeared to be fewer *S. n. nuttallii* after that winter also at False Bay on San Juan Island, Wash. (Lat. 48°29′ N., Long. 123°04′ W.) and on the San Juan Island Shore of Mosquito Pass (Lat. 48°35¼′ N., Long. 123°10½′ W.). Both these places have direct access to open channels, but like Crescent Beach have a substratum essentially of sand.

Since the time of these obseravtions, the senior author has been trying to explain this apparent situation. In the summer of 1951 the junior author, upon being presented with the above story, added his efforts. Now although there remain a number of unanswered questions, because the senior author is anticipating a move away from the Pacific Coast and because the junior author expects to have little time for zoological work in the future, we should like to present our tentative conclusions so that others may prove or disprove them.

Problems Posed

In question form, the items attacked may be posed as follows: 1. Are *S. n. nuttallii* and *S. n. capax* one or two species? 2. How can they be distinguished? 3. Do they have differences in habits and/or habitat preference? 4. Why would *S. n. nuttallii* be killed by a cold winter (if that is what killed them) while at the same place *S. capax* were unharmed? 5. Why were they apparently killed to a greater extent at some places than at others?

Tentative Explanations

1. Although we are not fully satisfied that no intergrades between *S. n. nuttallii* and *S. capax* occur, they appear to be definitely not the rule in this region where the two live side by side. Thus we are inclined to believe the two act like full and

separate species in this region. Careful study of the two species throughout their range of overlap which would appear to include suitable habitats on the Pacific coast of North America between at least 37° and 49° north latitude may prove intergradation in other places.

Their relative value as food may, beside explaining the great differences in the reputation of horse clams for food at different places, also be worth investigating biologically. It could have taxonomic bearing. In the region here considered, because of the time of day of spring tides and because of local habits and beliefs concerning the time of year when clams are good to eat, the vast majority of horse clams dug for food are taken between mid-March and mid-July. Thus if *S. n. nuttallii* were in that period in prime condition approaching summer spawning and *S. capax* spawned out from late winter spawning, the difference in quality would be quite understandable. This has not been proved and should be investigated.

2. The two species can in the vast majority of cases of adult individuals (shell over 3″ in length) be readily separated by their shells. However, because the two have been so thoroughly confused in the literature, their differences being minimized, and because the relationship to fossil forms has not been studied by the present writers, we illustrate shells of both in fig. 1 along with the recently described *S. keenae* Kuroda and Habe (1950) of Japanese waters. *S. nuttallii* is obviously much more extended posteriorly, and is not so high a shell dorso-ventrally as *S. capax.* The angle on the ventral side of the shell is much more marked in the latter. This angle continues up the sides of the valves.

The barnacle-on-the-siphon method of distinguishing the two before digging was surprisingly useful. Examination of complete specimens both alive and preserved (see figs. 2 and 3) revealed the siphonal plates to be much heavier and harder in *S. nuttallii* than in *S. capax.* As was further noted, the above mentioned difference in color of the periostracum over the siphon was at least in part a result of the fact that in *S. capax* this periostracum is constantly being sloughed off whereas in *S. nuttallii* it is retained as a tough, externally-smooth membrane. Further examination of siphonal plates leads the writers to

suspect that as they are secreted, the secreted material builds up by addition in *S. nuttallii,* whereas in *S. capax* the older outer layers peel off as new material is added internally. Injured siphons obviously do not show this clearly.

The senior author notes that by feeling of the siphons it is much more difficult to distinguish geoducks (*Panope*) from the horse clams in the San Juan region than at Tomales Bay, California, and is nearly certain that this is because of the softer siphon tips of *S. capax,* which is much more common in the more northern locality. On one occasion, clams were collected when small barnacles were settling on whatever was available. They were fully as numerous on the siphons of *S. capax* as *S. nuttallii.* The absence of large barnacles on the plates of *S. capax* would appear to result from the sloughing off of the outer part of the plates to which they are attached.

At the time studied (July and August 1951), the color of the interior of the siphonal canals, especially toward the distal ends of the siphons, was noted to be a brighter and deeper orange in *S. capax* than in *S. nuttallii.* In the muscles surrounding the orange lining, there was generally found considerably more purplish-blue color in *S. nuttallii* than in *S. capax.* Exact color designations have not been attempted, because this work is considered preliminary, needing checking in other places and at other times by other workers. The present writers also suspect consistent differences between the two species in numbers of papillae around the siphonal openings and possibly also in the color of these papillae.

3. Although the depths, at which these clams reside in the substratum as adults, are greatly affected by the texture of that substratum, our impression is that, conditions being the same, *S. nuttallii* digs the deeper. It also appears to prefer the looser soils-sands, fine gravels, and easily dug muds. *S. capax* in contrast appears to be found more commonly in more compact mud and gravel mixtures. This difference is not complete. Both are often found together.

4. In consideration of the apparent difference in the effect of extreme cold upon these clams, one is desirous of information concerning the winter of 1949–50 and of the geographic ranges of these species. The writers were duly impressed by the bliz-

zard of Jan. 13th, 1950; in one of its publications, the U. S. Department of Commerce (1950) summarizes the weather for Jan. 13–14, 1950 as "Apparently most severe cold storm . . . ever to have struck Washington state since records began. . . . Additional damage due to the aftermath of storm and further heavy snows and severe cold weather until end of month . . ."; and unpublished records of the Friday Harbor Laboratories indicate that between Jan. 12 and 17, both dates inclusive, the air temperature in our observation shack never rose above 23° F. and during the period the sea water temperature at approximately one meter below the surface dropped nearly a full degree Centigrade. To give some idea of the significance of these local observations, we point out that the air temperatures mentioned are recorded within 60 feet of the water from which the wind blows directly when in the northeast, as it did at that time. The sea water temperatures were taken as described by Phifer and Thompson (1937), where the water is well mixed and where the annual variation generally is scarcely over 6 to 7° C.

As indicated in Burch (1945), the exact extent of the ranges of the two clams is not completely known. Keen (1937) lists the range of *S. capax* as 37°–58° N. latitude and *S. nuttallii* as 28°–38° N. latitude. Dr. Keen has examined some of our shells and has conceded that the range of *S. nuttallii* extends at least as far north at 48° N.

Thus the species at or near the northern limit of its range apparently was severely affected by an unusual winter, whereas the species near the middle of its range was unaffected.

5. Apparently the extreme effect was felt at the head of East Sound. Records on file at the Oceanographic Laboratories of the University of Washington indicate that in summer the water in this 7-mile long narrow bay often reaches temperatures several degrees warmer than that of the open channels nearby. Thus one suspects that in periods of severe cold the reverse effect might prevail. The tide tables (U. S. Dept. of Commerce, 1949) predicted low tides for the nights of Jan. 12–17, 1950, as ranging from + 0.6 to − 2.1 feet from mean low low water. This means that for each of these nights the clam flats were exposed or under very shallow water for several hours. In East Sound with its head toward the north, the wind was with little doubt fun-

neled by the contour of the surrounding land so that it blew strongly down sound. This could have made the tides even lower.

As mentioned above, the writers suspected a reduction in population of *S. nuttallii* on other sand beaches but not on those having firmer (and incidentally blacker and more clayey) substrata. This poses two questions: Does a sand beach change its temperature more rapidly than one of a firm dark colored mud-clay-gravel mixture? Could the more deeply buried *S. nuttallii* in a sand beach be more severely affected by shifting of the substratum, incident to a severe storm, than the less deeply buried *S. capax,* or than *S. nuttallii* in a beach less shifted by the storm? To these questions, the writers have no answers. Future workers may find evidence on the subjects suggested.

Another aspect that may be pertinent is that of relative size of mantle cavity of the two species. The writers have frequently noted that *Schizothaerus* when disturbed in summer would eject from the siphons water considerably cooler than that standing in the hole over the clam before the latter was disturbed. Thus they suspect that the pumping of the water is appreciably reduced in rate at low tide. Because of the shape of its shell, they suspect that *S. capax* has a greater internal volume in comparison with its external surface than *S. nuttallii.* And if within its shell *S. capax* at that time also had less "meat," the volume of water held through the unfavorable low tide periods would be comparatively even greater. Whether this factor could be significant is not known.

Incidental Observations

1. In recent papers (Swan 1952, '53), I have suggested that where the clam *Mya arenaria* L. grows rapidly its shell is thinner than where its growth is slower. On several occasions in connection with the present work, beaches were studied where *S. capax* obviously grew very rapidly, but where no large specimens could be found. On a number of occasions when the largest clams were dug from the beaches, after they were removed from their burrows, the shell would be broken by the contraction of the adductor muscles. These were invariably sand beaches. Could it be that on a sand beach favorable for

the growth of *S. capax* this clam grows so rapidly that soon its shell is not strong enough for its mechanical needs?

2. After the same winter the populations of numerous other mollusks were noted to be reduced. Most interesting of these to the writers was *Mytilus edulis* L. This is a species said to range north to 72° N. (Keen, 1937). Does it consist of races varying in temperature tolerances? Were those living on local rocks inadequately acclimated before the freeze. Is it capable of living so far north because of great repopulating ability from residual "seed stocks" living below the level of the lowest tides?

Fraser (1921) reports similar effects for the winter of 1915–16, and Draycott (1951, p. 21) notes the death of thousands of *Mya arenaria* L. in the winter of 1949–50.

Acknowledgments

The writers wish to explain that their limited reference to the literature is purely in the interest of getting these observations before people who may be interested and is in no sense an attempt to claim as original observations what others have previously made.

On numerous occasions, Dr. Myra Keen of the School of Natural Sciences at Stanford University has freely given helpful advice. For a considerable amount of the hard work involved in collecting these species in the numbers studied and for helpful corroborating observations, the writers wish to thank Mr. Albert Bolst of the Zoölogy Department of the University of Washington. This study was assisted by the state of Washington funds for medical and biological research and made possible by the State of Washington Department of Fisheries through their permission for the collecting of clams of the genus *Schizothaerus* in quantities beyond the legal sports limit. The photographs, which add so much to the value of the work, were made by Whitie Marten of the Campus Studios of the University of Washington.

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THOUSANDS OF LIVING EUROPEAN SNAILS SOLD AS FISH BAIT IN STATE OF OHIO

By WILLIAM MARCUS INGRAM

Mariemont, Ohio

Introduction

The information contained herein was collected personally by the writer through contact with bait and tackle dealers who are selling living European snails for fish bait in the Cincinnati area of southwestern Ohio. The snail species are *Otala-lactea* Miiller and *Cepaea hortensis* (Müller). Locally these snails are recommended as good bait for the channel cat, *Ictalurus lacustris* (Walbaum), and the Black Bullhead, *Ameiurus melas* (Rafinesque), which are stocked in commercial fish ponds in southwestern Ohio. The stocking source is Lake Erie, from which these fish are carried by special truck, to be placed in numerous commercial fish-ponds in southwestern Ohio.

Price and Method of Shipping

Because of the competition revolving about bait and tackle dealers marketing of European snails for fish bait, data on the source of such importations are not very revealing. However, local dealers state that the European snails discussed here come from Italy through the port of New York. Local opinion is that they are imported into New York for use as food by Italians. Their value as fish bait apparently is not a prime factor for importation.

The price bait and tackle dealers pay for snails in bulk has not been determined. *Otala lactea* are marketed to fishermen in ice-cream cups or cottage cheese containers for forty cents a dozen while sixteen *Cepaea hortensis* cost twenty-five cents. A dozen *Otala lactea* may weigh some 66 grams, while a dozen *Cepaea hortensis* weighs some 35 grams. Bulk shipping containers in which *Otala lactea* are transported from Italy to New York and then to Cincinnati may hold as many as 3,600 individuals. Assuming that all snails are alive on arrival in Cincinnati the gross return on 3,600 snails would be one hundred and twenty dollars.

The writer has been able to obtain for exhibit purposes one container that had held *Otala lactea*. This container is hand woven from a green, uncured species of bamboo. It is cylindrical in shape with a height of 17½ inches and a diameter 16 inches. In the middle of the basket there is a perpendicular cylinder of woven bamboo, 16¾ inches high with a diameter of 3¾ inches. Such a shipping container is quite porous and allows for a good circulation of air through its physical construction. Snails shipped in such a container are in aestivation on arrival. The aestivation is apparently brought about and maintained by close packing and by air circulation. A layer of excelsior 3½ inches thick is placed in the top with another of the same thickness in the bottom of the container. These layers prevent the escape of snails from the large holes and slits that are especially prominent in the bottom and top of the basket, aid as shock cushions, and conceivably enhance aestivation.

Several bait and tackle dealers stated that very few dead snails are ever found when such baskets are unpacked.

On arrival in the dealer's hands in the Cincinnati area snails are removed from the shipping containers and are transferred to galvanized garbage cans. Here they are held in a dry state with epiphragms in place until they are sold.

Snail Importation and Legislation

The question of legislation against living snail importations has of recent years created a great interest in malacological circles, Teskey (1951) and Smith (1951). Popular articles on snail pests (such as appeared in the August, 1949, *Atlantic Monthly* and the October, 1949, *Reader's Digest*), pointing out the lack of Federal quarantines, have made people aware of the agricultural pest possibilities of certain introduced snails. An excellent paper by Abbott (1950) has surveyed imported land, fresh water, and marine pest snails that are now established in the United States.

A great deal of the interest in exclusion legislation has revolved around the so-called Giant African Snails, *Achatina*. The writer wishes to point out that while a Goliath may be attempting to make inroads within our midst that David should not be overlooked. If *Otala lactea* and *Cepaea hortensis* are being used in Ohio in the living state for fish bait, is there not reason to suppose that they are being shipped alive elsewhere? In ideal climatic zones in the United States they could at any time possibly become established to make inroads into American agriculture. Thus, another cost item may be added to final prices of certain crops to the consumer. The establishment of snail pests in agricultural areas of the United States may be a subtle process as illustrated by the establishment of the agricultural pest snail, the European Brown Snail, *Helix aspersa* Müller, in California, Abbott (1950), Bassinger (1931).

Method of Fishing with Snails and Snail Disposal

The common procedure of preparing introduced European snails for baiting the hook is to crush them with a whack of the hand against a board, rock, or any convenient object. After this is done the hook is placed through the foot and the shell pieces discarded. Once on the hook, the foot moves about, serv-

ing as a wriggling lure. The writer has taken young channel cats, Black Bullheads, and Pumpkinseeds, *Lepomis gibbosus* (Linnaeus), on snail bait.

The writer found that fishermen that did not use all of their snails would throw them off into the bushes. Several lots have been taken in herbaceous weeds marginal to commercial fish ponds in the Cincinnati area.

Depositories of Snail Exhibits

Samples of European snails, extended and preserved, that were purchased from bait and tackle dealers in the Cincinnati area are being deposited in the following institutions: U. S. National Museum, Washington, D. C.; University Museum, University of Michigan, Ann Arbor, Michigan; Academy of Natural Sciences, Philadelphia; Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; California Academy of Sciences, Golden Gate Park, San Francisco, California. A snail shipping container that was obtained in Cincinnati will be housed in the U. S. National Museum.

Acknowledgment

I wish to express my appreciation to William Nicholas Ingram who discovered the European snails being used for fish bait in Southwestern Ohio.

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HAROLD JOHN FINLAY, 1901–1951

Dr. Harold J. Finlay, one of the best-known workers on the recent and fossil mollusks of New Zealand, passed away on April 7, 1951.

He was born in India in 1901 as the son of Baptist missionaries. As a child he contracted a severe case of poliomyelitis, which caused his parents to move to New Zealand, where they settled in Dunedin. As a result of his illness he became confined to a wheel-chair for the rest of his life, a handicap that he bore stoically, and that did not prevent him from gaining an outstanding name for himself in his chosen field.

It was while an undergraduate at Otago University that Dr. Finlay became interested in paleontology, and began to collect recent and tertiary mollusks. His increasing interest in this subject soon caused him to abandon his first love of chemistry, and in 1924–1926 he did graduate work at the University of Otago as National Research Scholar in Paleontology.

In 1926 he was awarded the Hamilton Prize of the Royal Society of New Zealand, and in 1927 was given a D.Sc. for a comprehensive work on molluscan systematics. This was his well known "A Further Commentary of New Zealand Molluscan Systematics" (Trans. New Zealand Institute, vol. 57, 1926, pp. 320–485, pl. 18–23). From 1927–1929 he carried out biological work for the Fisheries Board of the Marine Department.

In 1933 Dr. Finlay took up the study of foraminifera and served as micropaleontologist with two oil companies in New Zealand. In 1937 he was appointed micropaleontologist to the New Zealand Geological Survey, where for the next fourteen years he carried on his studies on the foraminifera, adding to his already widely recognized renown as one of New Zealand's most distinguished paleontologists. In 1939 he received the Hector Award and Medal from the Royal Society of New Zealand for distinguished work on Mollusca and Foraminifera.

He leaves a wife, Mrs. Dorothy Finlay, and two daughters.

Although Dr. Finlay gave up the study of mollusks in his later years, his publications on that subject will always be of the greatest importance and value to malacologists all over the world. They are outstanding for the comprehensive knowledge

of malacology they reveal, and for the clarity of thought and thoroughness of preparation that is evident on every page.

Most of the material for this sketch was taken from a memorial by N. de B. Hornbrook, published in volume 5, no. 3 (July 1951) of *The Micropaleontologist*.—H. A. Rehder.

WILLIAM F. CLAPP

Dr. William F. Clapp of Duxbury, Massachusetts, died at his home on December 28, 1951 at the age of 71. He was born in Cambridge, Massachusetts in 1880. During his early years at Harvard College he met Alexander Agassiz and shortly afterward became an assistant in the Museum of Comparative Zoölogy devoting his time and energies to mollusks under Dr. Walter Faxon. He held this position from 1911 to 1923 when he resigned to take a research position at Massachusetts Institute of Technology working on the family Teredinidae. Some three years later he resigned from this position, but retained his association with the Institution, to set up a commercial laboratory at Duxbury, Massachusetts for the study of ways and means of combating the damage done by *Teredo* and other marine organisms. This laboratory shortly became one of the most important of its kind in the world, with many private companies and government agencies depending upon it for information on marine boring and fouling organisms in connection with their wharves and other marine installations throughout the world.

A more detailed account of Dr. Clapp and his work in the field of mollusks will be published later.—W. J. Clench.

NOTES AND NEWS

Dates of the Nautilus, Vol. 65, No. 1, pp. 1–36, pls. 1 and 2, Aug. 27, 1951. No. 2, pp. 37–72, pls. 3 and 4, Nov. 9, 1951. No. 3, pp. 73–108, pl. 5, Feb. 25, 1952. No. 4, pp. 109–144, i-vii, May 22, 1952.—H. B. B.

The European Planorbarius corneus var. ruber, or red ramshorn snail of the home aquarium, seemed quite prolific in the large tank so one was removed on January 24th for observa-

tion, and placed in a small bowl, with carefully washed greens and lettuce. The following record was kept daily for one month.

January 26: two egg deposits appeared on the side of the bowl, ¼ inch in diameter, and almost colorless. Jan. 27: cell-like segmentation was noted in one cluster. Jan. 28: two more egg deposits. Jan. 29: one egg. Jan. 31: one egg. Feb. 1: one egg. Feb. 2: two eggs. Feb. 4: one egg. Feb. 5: one egg. Feb. 8: two deposits. Feb. 10 to 14: snail eating, and for last two days remaining stationary on the bottom of the globe. Feb. 16: two new egg clusters. Feb. 17: one deposit on glass above water line. Feb. 20–23: no new deposits; two above water became dry and powdery. Feb. 24: some ten or twelve tiny snails were noted, crawling on the sides of the bowl. Record was closed.—Dorothy D. Freas, 8935 86th Street, Woodhaven 21, New York.

Mesanella, a new genus in the Camaenidae.—In a revision of the Philippine members of this family we have segregated several species that belong to a group quite separate and distinct from *Phoenicobius* Mörch, a group in which they have generally been included. The species in *Mesanella* are globose to depressed-globose usually wider than high and smooth to rather coarsely and axially ribbed. The shells may be of a plain color or banded. The shells of *Phoenicobius* are generally pupoid in shape with a dome shaped spire. They are usually higher than wide and often possess apertural teeth, a character not known to exist in *Mesanella.* Genotype, *Helix trailli* Pfeiffer.

Our studies indicate that this new genus occurs only on Palawan and the Balabac Islands. In addition to *Mesanella trailli* (Pfeiffer) it includes *M. monochroa* (Sowerby) and its many associated species and subspecies. *Mesanella* is named for Pedro de Mesa, a teacher of English in the Philippines, who has done much to advance our knowledge of Philippine mollusks, especially those from the islands of Lubang, Mindoro and Palawan.—W. J. Clench and R. D. Turner.

Corrections.—Localities (cf. 1950, Naut., 64, p. 56) for *Holospira roemeri* are Dierck's Ford, Guadalupe River, Kendal Co.; West Verde Creek, Bandera Co.; Sanderson, Terrell Co., Texas. *H. roemeri brevissima* Pilsbry also was found at Garner State Park, Uvalde Co., Texas.—C. D. Orchard.

Dates of publication of Johannes Thiele: Handbuch der Systematischen Weichtierkunde, Jena, Germany.—This work was originally issued in four parts and sent to subscribers as these parts were published. When the work was completed these four parts were collated and bound in two volumes. The dates were changed on the title pages of the bound volumes to correspond to the dates of issue of the second part of Volume I and the fourth part of Volume II. This is most unfortunate as many new names were introduced by Thiele and errors regarding dates of these names are certain to get into subsequent publications. The original dates are as follows:

Vol. I (Erster Band), part 1 (Erster Teil), pp. 1–376 .. 1929
part 2 (Zweiter Teil), title pages I–VI and pp. 377–778 1931
Vol. II (Zweiter Band), part 3 (Dritter Teil), pp. 779–1022 1934
part 4 (Vierter Teil), title pages I–VI and pp. 1023–1154 1935

The collated and bound sets carry the dates of 1931 for Volume I and 1935 for Volume II.—W. J. Clench.

The Fossil Snail Eggs of the Loess.—The occurrence of fossil snail eggs in the loess of the Upper Mississippi Valley has been noted by various authors, but to my knowledge no attempt has been made to identify them. These small hollow calcareous spheres are found in three distinct sizes. The smallest and most numerous range in diameter from 1.2 to 1.5 mm. The medium sized form is slightly oval, and ranges in size from 1.7 × 1.9 mm. to 2.1 × 2.2 mm. The large size, which is quite rare, range from 3.6 to 3.7 mm. in diameter.

The most abundant group of land snails of the loess, the Polygyridae, lay gelatinous shelled eggs which would not be preserved. The only genera known to me which lay calcareous shelled eggs are: *Haplotrema, Anguispira,* and *Discus.* Eggs *of Discus cronkhitei* measured 1.3 mm. in diameter. As *Discus cronkhitei* (Newcomb), *D. macclintocki* (F. C. Baker), and *D. shimeki* (Pils.) are abundant in the loess there seems to be little doubt that the small eggs belong to these species. The eggs of *Haplotrema concavum* (Say) and *Anguispira alternata* (Say) are not distinguishable. An egg of *H. concavum* measured 2.1 × 2.4 mm., and an egg of *A. a. crassa* (Walker) measured

2.2 × 2.4 mm. *H. concavum* is rare in the loess, but *A. alternata* is common, and it is quite probable that the medium sized eggs belong to it. Two eggs of *Anguispira kochi* (Pfr.) measured 3.4 × 3.9 and 3.5 × 3.5 mm. One of the large fossil eggs was found inside the shell of *A. kochi,* which leaves no doubt that the large snail eggs belong to this species.—Leslie Hubricht.

PUBLICATIONS RECEIVED

Directory of Conchologists. By John Q. Burch, 1584 W. Vernon Ave., Los Angeles, 1952. Price $1.50.—Most of us find frequent use for this list of about 1800 names and addresses of shell experts and collectors from all over the world.

Checklist and bibliography of the Recent Marine Mollusca of Japan. By Tokubei Kuroda and Tadashige Habe. Large 8vo, 210 pp., map. Edited and published by Leo W. Stach. Price $4.00 U. S.—The list includes 1,048 bivalves, 3,313 univalves and 34 scaphopods. The checklist is in the form of an alphabetic list of the generic names applied to Japanese marine Mollusca with the species listed alphabetically under each genus. The numbers of the appropriate bibliographic references (more than 1,700) are given after each species and genus. Invalid names are cross-referenced to the current valid names. The range in latitude north of the equator, and the province of each species is indicated.

This work should form a valuable basis for reference by collectors. Some new generic names are proposed, and some new specific names are included for forms previously misidentified. It is obtainable from Leo. W. Stach, Tokyo Central Post Office, Box 121, Tokyo, Japan—H. A. P.

In recent years a number of articles pertaining to mollusks have been published in the *Bulletin of the Southern California Academy of Sciences.* Inasmuch as the latest volume of the Zoological Record includes only articles published prior to 1948, the titles and new species described in this Bulletin from 1948 to 1951 are here listed for the convenience of students:

Volume 47

Part. 1. Jan.–Apr. 1948, pp. 11–16. Ingram, W. M., A check list of the *Haplotrematidae, Testacellidae* and *Zonitidae* of California.

Pp. 17–20. Willett, Geo., Four new gastropods from the Upper Pleistocene of Newport Bay Mesa, Orange Co., Calif. (*Turbonilla* (*Turbonilla*) *grouardi, Odostomia* (*Menestho*) *effiae, Odostomia* (*Chrysallida*) *elsiae, Triphora kanakoffi,* n. spp.).

Part 3. Sept.–Dec., 1948, pp. 100–102. Gregg, W. O., A new and unusual helicoid snail from Los Angeles Co., Calif. (*Sonorelix* (*Herpeteros*) *angelus,* n. sp.).

Volume 48

Part 1. Jan.–Apr., 1949, pp. 13–18. Hertlein, L. G., and Hanna, G. D., Two new species of *Mytilopsis* from Panama and Fiji (*Mytilopsis allyneana* and *zeteki,* n. spp.).

PP. 19–34. Ingram, W. M., A check list of the *Limacidae, Endodontidae, Arionidae, Succineidae, Pupillidae, Valloniidae, Carychiidae,* and *Truncatellidae* of California.

Part 2. May–Aug., 1949, pp. 71–93. Strong, A. M., Additional *Pyramidellidae* from the Gulf of California (*Turbonilla* (*Chemnitzia*) *sinaloana,* T. (*Strioturbonilla*) *asuncionis, T.* (*Pyrgiscus*) *alarconi, T.* (*Pyrgiscus*) *kaliwana, T.* (*Pyrgiscus*) *guaicurana, T.* (*Pyrgiscus*) *aripana, T.* (*Pyrgiscus*) *cochimiana, T.* (*Pyrgiscus*) *pericuana, Odostomia* (*Chrysallida*) *sorensoni, O.* (*Ividella*) *ulloana, O.* (*Menestho*) *ciguatanis,* n. spp.).

Volume 49

Part 1. Jan.–Apr., 1950, pp. 15–28. Hand, Cadet, and Ingram, W. M., Natural history observations on *Prophysaon andersoni* (J. G. Cooper), with special reference to amputation.

Part 3. Sept.–Dec., 1950, pp. 79–89. Kanakoff, G. P., Contributions from Los Angeles Co. Museum—Channel Islands Biol. Surv. No. 34. Some observations on the land snails of San Clemente Island. (*Micrarionta* (*Xerarionta*) *agnesae,* n. sp.).

Volume 50

Part 2. May–Aug., 1951, pp. 68–75. Hertlein, L. G., Descriptions of two new species of marine pelecypods from West Mexico. (*Ostrea corteziensis* and *Tagelus* (*Mesopleura*) *bourgeoisae,* n. spp.).

Pp. 76–80. Hertlein, L. G., and Strong, A. M., Descriptions of three new species of marine gastropods from West Mexico and Guatemala (*Latirus soccoroensis, Aspella bakeri,* and *Marginella woodbridgei,* n. spp.).

Pp. 89–91. Emerson, W. K., An unusual habitat for *Zirfaea pilsbryi.*

Part 3. Sept.–Dec., 1951, pp. 152–155. Hertlein, L. G., and Strong, A. M., Descriptions of two new species of marine gastropods from West Mexico and Costa Rica (*Acmaea turveri* and *Alvania milleriana,* n. spp.).

Pp. 156–159. Gregg, W. O., A new *Sonorella* from the Chiricahua Mtns., Ariz. (*Sonorella neglecta,* n. sp.).—W. K. Emerson.

The Mussels of the Mississippi River.—By Henry and Annette van der Schalie. American Midland Naturalist 44, No. 2, 1950. This review is based largely upon the survey conducted by Max M. Ellis and his staff in 1930 and 1931, but with cognizance of the large body of previous data. The distribution patterns of the naiades are discussed, and the following regions are recognized. I, Atlantic, characterized by the preponderance of *Elliptio,* and extending south to the Altamaha River, Georgia. II, Pacific. III, Mississippi. IV, Ozark, with *Arkansia wheeleri,* etc. VI, Cumberlandian. VII, West Floridan or Appalachicolan, in western non-peninsular Florida, with *Quincuncina, Margaritana hembeli,* etc. A map illustrates these divisions, which agree well with those indicated if the prosobranch gastropods be taken into account. However, apparently one additional region, the Alabaman would be needed, on account of the development of peculiar pupiform *Pleuroceridae, Tulotoma, Lepyrium,* etc.

The publication is already so condensed that no summary can give an idea of the data presented on distribution of Mississippi River mussels.—H. A. P.

THE NAUTILUS

Vol. 66 OCTOBER, 1952 No. 2

NEW GASTROPODS FROM THE BLANCO FORMATION (NEBRASKAN AGE, PLEISTOCENE) IN KANSAS

By A. BYRON LEONARD

Fossiliferous deposits in the Nebraskan Stage of the Pleistocene are known from the David City formation in northeastern Kansas (Doniphan County), from the Blanco formation in the south-central part of the State (Kingman County), and in several counties of the southwest, notably Meade and Seward. Molluscan faunas from sands and silts in these formations are being studied as part of a comprehensive investigation of the sequence of molluscan faunal assemblages in Pleistocene deposits in the midcontinent region, but particularly in Kansas. A distinctive molluscan faunal assemblage has been described from late Kansan or early Yarmouthian Stage of the Pleistocene sediments here (Frye, Swineford and Leonard, 1948; Leonard, 1950); distinctive molluscan faunal assemblages have been listed from Illionian and Wisconsinan stages of the Pleistocene in Kansas (Frye and Leonard, 1951); molluscan faunas have been utilized to zone stratigraphically the massive Peoria loess in the State (Leonard, 1951); and a detailed report of studies of the molluscan faunal assemblages in the Illinoian and Wisconsinan stages of the Pleistocene has recently been published (Leonard, 1952). A study of the mollusks in Pleistocene sediments of Nebraskan Age is now in progress.

Study of the fossil mollusks of Nebraskan Age in Kansas has resulted in the discovery of several undescribed kinds of gastropods in these sediments. It is the purpose of this paper to name, describe and illustrate these fossil gastropods.

AMNICOLA CRYBETES, new species. Plate 5, fig. A

Holotype.—Catalogue number 3805, Molluscan Collection, University of Kansas Museum of Natural History. Type and paratypes from type locality collected by C. W. Hibbard.

Horizon and type locality.—Blanco formation (Nebraskan Age, Pleistocene). Fifteen miles east of Liberal (center W line, sec. 36, T. 34 S, R. 31 W), Seward County, Kansas.

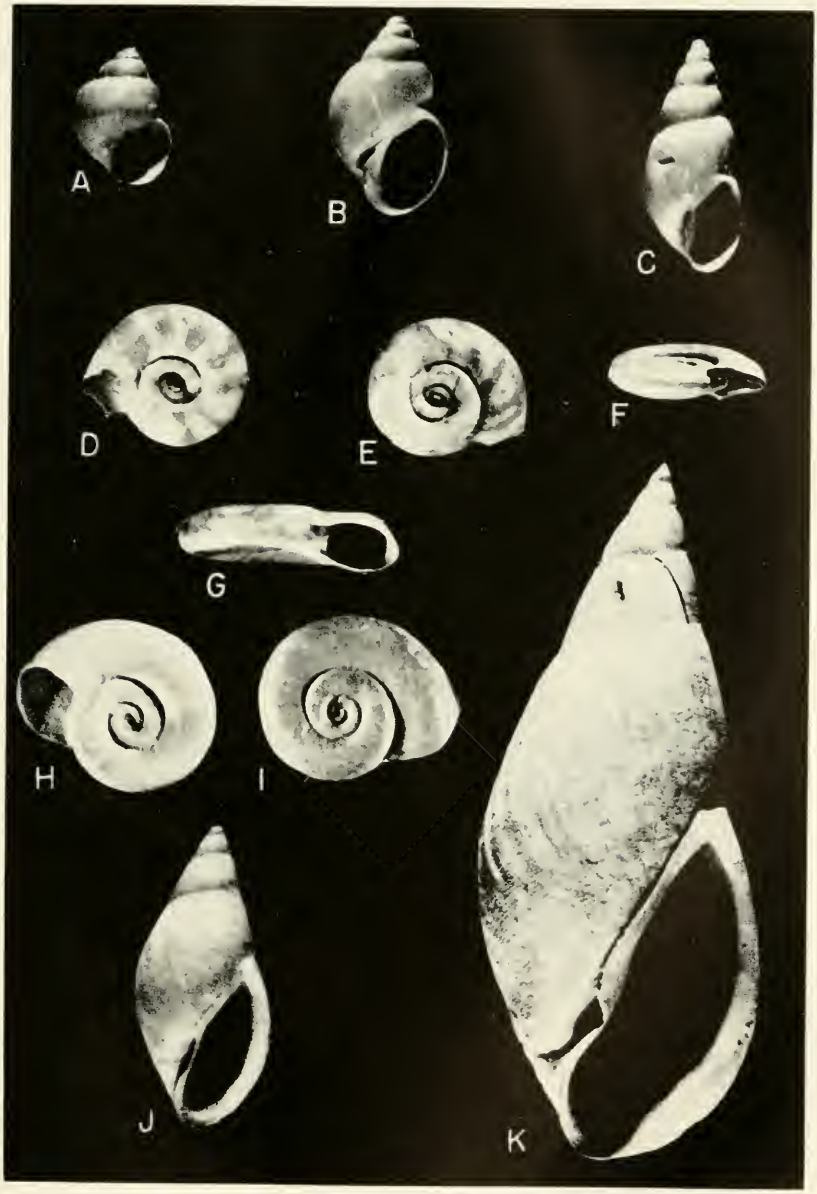
Diagnosis.—Shell small, a little more than 3 mm. high, broadly conic, perforate, whorls strongly convex, turreted, 5 in number, the last inflated; suture deeply impressed; first whorl subplanorbid.

Description of holotype.—Shell small, broadly conic, perforate; whorls 5 in number, strongly convex, increasing rapidly in diameter, the last inflated; suture deeply incised; apex not acute; first whorl subplanorbid; height of spire half that of shell; peristome continuous, not adnate to preceding whorl, broadly oval above, rounded below; lip thin, sharp, simple, somewhat reflected over the round umbilical perforation, but not closing it; nuclear whorl finely granular, remaining whorls with fine, raised, vertical lines, which at short intervals coalesce into low ridges of variable width; spiral lines wanting.

Comparisons.—*Amnicola crybetes* differs from *A. walkeri* in its larger size, less broadly conic outline, and greater number of whorls; it is smaller and more broadly conic than *A. lustrica.* Since it is impossible to determine the relationships of kinds of Amnicola from the shell alone, the true affinities of this species remain uncertain.

	Height	Diameter	Aperture height	Aperture width	Number of whorls
Type	3.33 mm.	2.25 mm.	1.55 mm.	1.35 mm.	5
Paratypes (no. 3806)	3.24 mm.	2.34 mm.	1.44 mm.	1.35 mm.	5
	3.33 mm.	2.34 mm.	1.53 mm.	1.35 mm.	5
	3.40 mm.	2.52 mm.	1.62 mm.	1.36 mm.	5
	3.35 mm.	2.45 mm.	1.50 mm.	1.37 mm.	5

The name *"crybetes"* is from the Greek word meaning "hidden in the earth."



Leonard: New Gastropods from the Blanco formation.

LYMNAEA DIMINUTA, new species. Plate 5, fig. B

Holotype.—Catalogue number 8801, Molluscan Collection, University of Kansas Museum of Natural History, Type and paratypes collected by A. B. Leonard and Alice E. Leonard.

Horizon and type locality.—Blanco Formation (Nebraskan Age, Pleistocene). Nine miles south, 7 miles west of Meade (SW ¼ sec. 22, T. 33 S, R. 29 W), Meade County, Kansas.

Diagnosis.—Shell small, approximately 5 mm. high, conic, with 5 moderately convex whorls, gradually enlarging, except the last which is greatly enlarged and ventricose; aperture broadly ovate; inner lip of peristome reflected upon, and adnate to the preceding whorl, leaving round umbilicus open by small chink.

Description of holotype.—Shell conic, of medium size for the genus; 5 moderately convex whorls, nuclear whorl planorbid, those of spire turreted, last greatly enlarged and ventricose; aperture broadly ovate, more than half as high as shell; outerlip of peristome simple, strongly convex; inner lip thin, upper part adnate to preceding whorl, lower part reflected over columella, without entirely closing round umbilicus; nuclear whorl smooth, remaining whorls with inconspicuous, raised, vertical striae; no spiral striae.

Comparisons.—*Lymnaea diminuta* seems to have derived from a stock of *L. humilis,* or at least to be related to it, but it does not intergrade with it in the known populations. *Lymnaea diminuta* is quite unlike the other small Lymnaeas, such as *L. parva* and *L. dalli.*

	Height	Diameter	Aperture height	Aperture width	Number of whorls
Type	5.2 mm.	2.9 mm.	2.9 mm.	2.0 mm.	5
Paratypes (no. 3774)	5.1 mm.	2.6 mm.	2.2 mm.	1.8 mm.	5
	4.3 mm.	2.4 mm.	2.3 mm.	1.8 mm.	5
	4.2 mm.	2.5 mm.	2.3 mm.	1.5 mm.	5
	4.1 mm.	2.6 mm.	2.5 mm.	1.6 mm.	5

LYMNAEA TURRITELLA, new species. Plate 5, fig. C

Holotype.—Catalogue number 3807, Molluscan Collection, University of Kansas Museum of Natural History. Type and paratypes from type locality collected by C. W. Hibbard.

Horizon and type locality.—Blanco Formation (Nebraskan Age, Pleistocene). Fifteen miles east of Liberal (center W line, sec. 36, T. 34 S, R. 31 W), Seaward County, Oklahoma.

Diagnosis.—Shell characterized by small size, elongate, narrowly conic form, with 5 to 5½ turreted whorls, and small, oval aperture.

Description of holotype.—Shell small, narrowly conic, 5½ turreted whorls, which increase regularly in size, all whorls flattened and strongly shouldered above, except body whorl, which is slightly swollen and convex; suture deeply impressed; apex sub-acute; nuclear whorl small, subplanorbid; height of spire more than half that of shell; aperture elongate-oval; terminations of peristome connected by a thin callus across preceding whorl; peristome thin, simple along angular border, reflected along parietal part, sinuous, nearly covering narrow umbilical perforation; nuclear whorl finely granular, succeeding whorls with fine but distinct, vertical, raised striae that increase in coarseness toward body whorl; spiral sculpture absent.

	Height	Diameter	Aperture height	Aperture width	Number of whorls
Type	6.2 mm.	2.7 mm.	2.3 mm.	1.4 mm.	5½
Paratypes (no. 3808)	5.8 mm.	3.1 mm.	2.0 mm.	1.8 mm.	5
	5.9 mm.	2.8 mm.	2.6 mm.	1.7 mm.	5½
	5.4 mm.	2.6 mm.	2.4 mm.	1.5 mm.	5
	5.3 mm.	3.1 mm.	2.1 mm.	1.8 mm.	5

Comparisons.—*Lymnaea turritella* is smaller than most examples of *L. parva*, but is somewhat larger than *L. dalli*; and slendered than either *L. parva* or *L. dalli*. The turreted whorls of *L. turritella* are quite unlike those of any small species of *Lymnaea* known to me.

The name "*turritella*" is the diminutive form of the Latin word meaning tower, and is here applied in reference to the turreted spire of this fossil shell.

LYMNAEA MACELLA, new species. Plate 5, fig. J

Holotype.—Catalogue number 8804, Molluscan Collection, University of Kansas Museum of Natural History. Type and paratypes collected by A. B. Leonard and Alice E. Leonard.

Horizon and type locality.—Blanco Formation (Nebraskan

Age, Pleistocene). Nine miles south, 7 miles west of Meade (SW ¼ sec. 22, T. 33 S, R. 29 W), Meade County, Kansas.

Diagnosis.—Shell 7–9 mm. in height, rimate, with 5–6 moderately flat-sided whorls, the last greatly enlarged; spire acute but not attenuate; aperture narrowly ovate, with heavy varix within; aperture more than half as high as shell; surface sculpture of intersecting spiral and vertical lines.

Description of holotype.—Shell small, rimate, 5½ whorls, only slightly convex, except the last, which is moderately inflated; suture impressed but not deeply; nuclear whorl subplanorbid; aperture narrowly ovate and more than half as high as shell, acutely narrowed above, rounded below, outer lip of peristome with heavy varix, forming triangular ridge within, inner peristome nearly straight, slightly sinuous, reflected against preceding whorl, but not entirely closing umbilicus; nuclear whorl smooth, remaining whorls with numerous fine impressed undulating vertical lines, intersected by numerous fine, impressed, spiral lines.

Comparisons.—*Lymnaea macella* is unlike *L. parva* (of similar size) or the smaller *L. dalli; L. macella* seems to be related to *L. parexilis*, which it resembles in general form and in surface sculpture, but from which it differs in size, its total length being less than half that of *L. parexilis*, in heavier varix within the palatal portion of the peristome, and in larger, more nearly planorbid nuclear whorl.

	Height	Diameter	Aperture height	Aperture width	Number of whorls
Type	8.5 mm.	4.0 mm.	5.0 mm.	2.1 mm.	5½
Paratypes (no. 3766)	9.1 mm.	3.8 mm.	4.6 mm.	2.1 mm.	6
	8.4 mm.	3.5 mm.	4.6 mm.	1.9 mm.	5½
	8.8 mm.	3.7 mm.	5.0 mm.	2.2 mm.	5½
	8.7 mm.	4.0 mm.	5.1 mm.	2.1 mm.	5
	8.7 mm.	3.9 mm.	5.0 mm.	2.0 mm.	5½

The name "*macella*" is derived from the Greek word meaning "a single-pointed pick-axe," and is here applied in reference to the pointed spire and heavy shell.

LYMNAEA PAREXILIS, new species. Plate 5, fig. K

Holotype.—Catalogue number 8805, Molluscan Collection, University of Kansas Museum of Natural History. Type and paratypes collected by A. B. Leonard and Alice E. Leonard.

Horizon and type locality.—Blanco Formation (Nebraskan Age, Pleistocene). Nine miles south, 7 miles west of Meade (SW ¼ sec. 22, T. 33 S, R. 29 W), Meade County, Kansas.

Diagnosis.—Shell of medium size for the genus, of 6 (occasionally 7) whorls; slender in general form, with acute spire, nearly flat-sided whorls, and shallowly impressed suture; aperture elongate, narrow, its length less than that of spire; palatal peristome thickened within, parietal portion reflected over columella, closing umbilicus.

Description of holotype.—Shell medium in size for the genus, elongate spiral in form; whorls 6 in number, nearly flatsided, oblique, gradually increasing in length; suture not deeply impressed; spire attenuate, acute, body whorl elongate, only slightly inflated; aperture narrowly ovate, narrowing above, slightly produced below, length slightly less than height of spire; peristome thickened within; palatal lip convex, simple, parietal lip nearly straight, reflected against preceding whorl, closing umbilicus; 1½ nuclear whorls smooth, surface sculpture on succeeding whorls of coarse, raised, vertical growth striae, with fine, impressed wrinkled, parallel lines between them; fine, impressed, spiral lines intersect vertical lines, producing fabric-like surface.

Comparisons.—The shell of *Lymnaea parexilis* is similar in general form to that of *L. exilis,* but is much smaller with a relatively more elongate aperture, and more intricate sculpture. *Lymnaea parexilis* is slenderer, generally smaller, and its whorls are more nearly flat-sided than those of *L. palustris* or *L. reflexa.*

	Height	Diameter	Aperture height	Aperture width	Number of whorls
Type	18.2 mm.	5.2 mm.	8.8 mm.	3.2 mm.	6
Paratypes (no. 3786)	20.3 mm.	7.7 mm.	9.4 mm.	4.5 mm.	6
	20.0 mm.	6.4 mm.	9.2 mm.	3.7 mm.	7
	19.0 mm.	7.0 mm.	9.1 mm.	3.2 mm.	6
	18.2 mm.	5.2 mm.	8.8 mm.	3.2 mm.	6

The name of this species is given because it superficially resembles *Lymnaea exilis,* to which it seems to be related.

PROMENETUS BLANCOENSIS, new species. Plate 5, figs. D, E, F

Holotype.—Catalogue number 8802, Molluscan Collection, University of Kansas Museum of Natural History. Type and paratypes from type locality collected by C. W. Hibbard.

Horizon and type locality.—Blanco Formation (Nebraskan Age, Pleistocene). Seventeen miles south, 12 miles west of Meade (sec. 35, T. 34 S, R. 30 W), Meade County, Kansas.

Diagnosis.—A small planorbid shell, greater diameter slightly less than 4 mm.; ultra-dextral, broadly umbilicate, with 3–3½ gradually enlarging whorls, all visible above and below, aperture trianguloid, wider than high; surface sculpture of fine, oblique, transverse striae; spiral striae absent; many, but not all, shells irregularly banded with shades of tan and brown (figs. D, E.).

Description of holotype.—Shell small, planorbid, ultra-dextral, broadly umbilicate; spire sunken, all volutions visible above and below; 3¾ whorls, gradually increasing in size, slightly convex above, but shouldered near umbilicus, flattened to slightly excavate below, body whorl with broad, shallow excavation near midline above and below, extending backward from peristome for length of one-half volution; aperture trianguloid, width greater than height; peristome thin, simple, terminations half encircling preceding whorl, thin callus across parietal wall; nuclear whorl smooth, remaining whorls with fine, transversely oblique striae, giving the surface a silky texture; spiral striae absent, shell irregularly banded with shades of tan and brown.

Comparisons.—*Promenetus blancoensis* resembles *P. umbilicatellus,* from which it differs in its smaller size, lesser number of whorls (always less than 4), non-striate nucleus, absence of spiral sculpture, and depressed spire. If the shell was, indeed, colored in life with alternate bands of pigment, as the fossil shell strongly suggests, this is remarkable since color patterns among planorbids are rare.

	Height	Diameter (greater)	Aperture height	Aperture width	Number of whorls
Type	1.3 mm.	3.9 mm.	1.3 mm.	1.4 mm.	3¾
Paratypes (no. 3804)	1.1 mm.	3.9 mm.	1.0 mm.	1.5 mm.	3¾
	1.1 mm.	3.8 mm.	1.0 mm.	1.4 mm.	3¾
	1.2 mm.	3.7 mm.	1.1 mm.	1.3 mm.	3½
	1.1 mm.	3.8 mm.	1.0 mm.	1.2 mm.	3¾

The name of this species is derived from the name of the geological formation in which it has been found.

GYRAULUS ENAULUS, new species. Plate 5, figs. G, H, I

Holotype.—Catalogue number 8803, Molluscan Collection, University of Kansas Museum of Natural History. Type and paratypes from type locality collected by C. W. Hibbard.

Horizon and type locality.—Blanco Formation (Nebraskan Age, Pleistocene). Fifteen miles east of Liberal (center W line, sec. 36, T. 34 S, R 31 W), Seward County, Kansas.

Diagnosis.—Shell of small size, approximately 5 mm. in diameter, planorbid, ultra-dextral, with slightly less than 4 whorls, rounded above, somewhat flattened below, and rapidly increasing in size; aperture ovate, oblique; periphery near base; nuclear whorl smooth to granular, and remaining whorls with coarse, obliquely transverse striae; no spiral striae.

Description of holotype.—Shell small, planorbid, spire slightly depressed, base excavate, without definite umbilicus; 3¾ whorls, rapidly increasing in size to aperture, rounded above to periphery near base, slightly convex to flattened below; first 2 whorls of spire sunken, but all volutions visible above and below; base broadly excavate, no distinct umbilicus; aperture elongate-oval; wider than high, oblique; peristome thin, simple, oblique, produced above, terminations connected by callus across parietal wall; nuclear whorl smooth, remaining whorls coarsely and obliquely striate; spiral striations absent.

Comparisons.—Similar in general form to *Gyraulus labiatus* but smaller, with fewer whorls and with coarse striae. *Gyraulus enaulus* differs from *G. similaris* by its coarser striae, subcarinate periphery, and less rounded whorls.

	Height	Diameter (greater)	Aperture height	Aperture width	Number of whorls
Type	1.4 mm.	5.4 mm.	1.4 mm.	1.7 mm.	3¾
Paratypes (no. 3798)	1.5 mm.	5.5 mm.	1.4 mm.	1.6 mm.	3¾
	1.4 mm.	5.6 mm.	1.2 mm.	1.6 mm.	3¾
	1.4 mm.	5.7 mm.	1.3 mm.	1.6 mm.	4
	1.3 mm.	5.6 mm.	1.3 mm.	1.6 mm.	3¾

The name "*enaulus*" is from a Greek word meaning "a water course," and is used here in reference to the stream-laid sediments in which these fossils occur.

Baker (1938: 126) was the first to study mollusks from sediments now included in the Blanco Formation. He described *Carychium perexiguum, Menetus kansasensis, Strobilops sparsicosta*, and *Vertigo hibbardi* from materials sent to him by C. W. Hibbard. Because the stratigraphical relationships of the deposits from which the shells came were not properly understood at that time, Baker thought these gastropods were of Tertiary

Age, and commented that *Carychium* and *Menetus* had not previously been reported from Tertiary horizons, at least in the Mississippi Valley. At the time that Franzen and Leonard (1947: 338, 346) described *Gastrocopta rexroadensis* and *G. paracristata* from these sediments, the deposits had been placed in a provisional time zone, the Blancan (Elias et al., 1945: 270), designed to include beds and faunas younger than the algal limestone (Ogallala Formation: Pliocene) and older than beds of undoubted Pleistocene age (as understood at that time). It is now known that the sediments in question which include the silts and sands in the Blanco Formation, and from which a total of 13 species have been described, making the total known molluscan assemblage more than twice that number, belong in the Nebraskan Stage of the Pleistocene. *Carychium* and *Menetus* have not yet, to my knowledge, been recovered from undoubted Tertiary strata in the Mississippi Valley.

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RAFINESQUE'S SLUGS

By LESLIE HUBRICHT

C. S. Rafinesque, in 1820, Annals of Nature, page 10, described seven new species of slugs from the eastern United States. Because these descriptions were so poor, only two of his names have been generally recognized. After giving his descriptions cosniderable study it seems that the other five species can be recognized. All of them as synonyms of well known species. The descriptions of these five species were reprinted in Henry A. Pilsbry, Land Mollusca of North America, vol. II, part 2, page 770.

69. *Philomycus quadrilus.* This is undoubtedly *P. carolinianus* (Bosc). The "length over half an inch" indicates a young slug. The color "gray, back smooth, with four longitudinal rows of irregular black spots" is the characteristic color pattern of very young *carolinianus.* The habitat "on the banks of the Hudson" indicates that he was describing the typical form of the flood-plains, rather than the upland *P. carolinianus collinus* Hubricht.

70. *Philomycus oxyurus.* This is *Deroceras laeve* (Müller). The description is a very good one of that species as far as it goes, and there is no other native species that the description would fit.

71. *Philomycus fuscus.* The length "one-fourth of an inch" indicates a very young slug. The only native slug with "tail compressed, acute" is *Deroceras laeve.*

XVII. N. G. Eumelus. This description is that of a sleeping slug with the mantle pulled over the head down to the smaller tentacles. The ends of the larger tentacles projecting from below the edge of the mantle, giving the appearance of "four tentacula almost in one row in front and cylindrical, nearly equal, the smallest pair between the larger ones." *Eumelus* belongs in the synonymy of *Philomycus.*

73. *Eumelus nebulosus.* There is less certainty about the identity of this species than any of the others. All that one can tell from the description is that it is a spotted slug. It suggests *Philomycus flexuolaris* (Raf.), but the range "in Ohio and Kentucky" is too far west for that species. It is probably

Philomycus carolinianus (Bosc), or an upland form of that species without the two rows of black spots. More knowledge of the slugs of that region is needed to identify this species with certainty.

74. *Eumelus lividus.* There can be no doubt about the identity of this species. Specimens were collected on west bluff, Frankfort, Franklin Co., Kentucky, which fit the description perfectly. The series collected is quite variable. Some specimens are a uniform "livid brown above," others show three longitudinal bands of a darker brown, others show varying degrees of intergradation to *Philomycus carolinianus.* One specimen is a uniform brown with two rows of black spots along the back. Such uniform brown slugs are found associated with *Philomycus carolinianus* over a wide range, from southern Michigan and central New York to western North Carolina and eastern Tennessee. They apparently represent a color phase in which the pigment is diffused instead of forming a definite pattern.

A BRISTLED MONADENIA FROM CALIFORNIA

By ROBERT R. TALMADGE

In the early spring of 1952, the writer found several bleached worn shells of a *Monadenia* in the loose talus on the western face of Ironside Mountain, northern Trinity County, California. Several of the better preserved shells were compared with a series of the local complex of *Monadenia fidelis.* It was noted that the bleached shells had a much smaller and more open umbilicus than the typical forms from this general region. Finally in April 1952, living examples were discovered on the moss and in the forest duff that accumulated under trees on the more stable portions of the talus. The living adults are so different from any other of the coastal or interior coastal forms that a new species is indicated. Therefore the writer proposes the following name.

Monadenia setosa, new species.

A medium sized, depressed *Monadenia*; spire, a low even cone of six and one-half whorls average, whorls rounded in adults,

with a carina noted in the juveniles, but not as acute as other northwestern *Monadeniae*. The umbilicus is open, and averages one-tenth the major diameter of the shell, straight sided. Aperture ovate, somewhat depressed on the dorsal side, Peristome thin and hairlike, recurving slightly on only a few extreme adult specimens. The sculpture consists of a series of fine striae crossing the whorls at an angle of forty-five degrees. Periostractum dull, over entire surface, covered with small papillae, each of which has a short bristle protruding from the center. The papillae and bristles are on both the ventral and dorsal surfaces, only being absent in the area around the columella. Coloration. Dorsally the snail is chestnut, with the sutures shaded into a dark chestnut. On the periphery there is a dark brown band about 2 mm. wide, below which is a band ranging from ochre to umber that is also 2 mm. in width. From this lighter band and covering the entire ventral surface the shell is a dark brown. All shells have the same pattern and color, being remarkably uniform for a *Monadenia*.

The animal is longer and more slender than the animal of a *Monadenia fidelis* of like size, the feelers are also longer and more slender. Maculations are rod shaped and follow an even pattern on the contour of the animal, they are also larger and more pronounced than in a typical *fidelis*. The dorsal line is indistinct or absent in most specimens. The foot is a dead gray, maculations a livid grayish purple, with the interspacing areas a dark purple or black.

Measurements:

Number	Max. Dia.	Min. Dia.	Alt.	Dia. of Umb.	Whorls	
705	33	29	18	3	6½	Paratype
706	35	30	20	3.5	6¾	Paratype
707	33	29	19	3	6½	Paratype
708	34	28	18	3.5	6½	Paratype
709	33	28	16	3	6½	Paratype
710	32	26	16	3	6½	Holotype
711	32	28	18	3	6½	Paratype
712	30	26	16	3	6½	Paratype

Holotype and Paratypes in the Talmadge Collection, at Willow Creek, California. Paratypes to be deposited in the collec-

tion of the California Academy of Sciences in San Francisco, and in the collection of Allyn G. Smith at Berkeley, California.

Type Locality: Swede Creek, a tributary to the Trinity River, northern Trinity County, California.

Discussion: Ironside Mountain, a mass of Franciscan schist, is a broken ridge-like peak that rises abruptly from the Trinity River. This wall-like peak is broken in several places by chasm-like gorges, that contain small fast flowing streams. The slopes are footed by talus slopes, that in places have become stable enough to support a forest growth. This growth is the typical oak, fir and pine. Under this forest growth the usual moss and forest duff accumulates between and on the rocks. The first bleached shells were discovered on the deer trails that crossed the talus slides, and much time was spent working over this type of formation. The bleached shells gave no indication of the bristles, so again time was wasted looking for a more or less typical *Monadenia fidelis.* These bristles were also the cause of the snail not being found sooner. Mud, dust, and spider webs as well as bits of moss adhered to the short whiskers to such an extent that the living snail resembled a pebble or clod. The writer has noted this also on some of the local *Vespericola* in the same area. Each shell collected represented a careful foot-by-foot search in the moss and duff under the trees.

In color this snail resembles some of the darker forms of *Monadenia fidelis,* but does not have the variations of colors found in such a colony. The dorsal surface with the papillae and short bristles resembles somewhat the *Monadenia infumata,* but here again the design of the papillae is different and covers the entire shell. The design and shape of the papillae as well as the habitat resemble the *M. churchi,* but the size, thickness of shell, and bristles separate it immediately from this species. There is no other *Monadenia* in northwestern California that could be confused with this snail. It is distinct and may be separated in the field from any other species on sight.

The name *setosa* is derived from the Latin for bristled or whiskered. The writer wishes to thank the California Academy of Sciences for the use of their collection of land mollusks for comparative work in running down certain forms. He also

wishes to thank Allyn G. Smith of Berkeley for guidance in working out the species.

Willow Creek, California

LITTORIDINA TENUIPES (COUPER)

By H. A. PILSBRY

Although more than a century has passed since this species was described, nothing material has been added to the original observations of Couper and Haldeman. The writer's attention having been called to this neglected species, it was thought that the publication of some observations made over thirty years ago may not be considered out of place.[1]

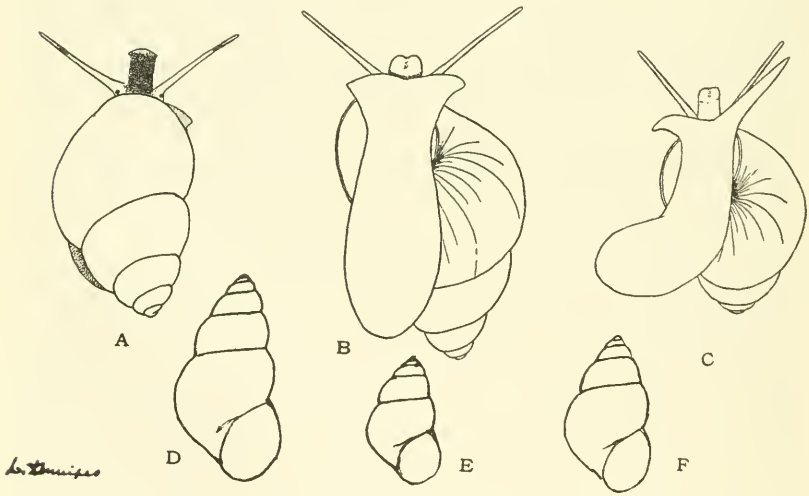

Fig. 1. *L. tenuipes.* A, B, C, living animal. D, E, F, Tracings of figures of the shell.

While it is still thought that *"Amnicola" tenuipes* belongs to the mainly South American genus *Littoridina,* yet the difference in the verge seems to call for a subgeneric distinction.

Littoridina, type *L. guadachaudii* Souleyet (Ecuador). Verge having several short lateral appendages (which typically are divided or papillose at their ends) along its length on both sides; tapering to a point at the end.

[1] The following notes and figures are adapted from the MS. of an unpublished work on New York mollusks.

Littoridinops, n. subg., type *L. tenuipes* (Couper). Verge having groups of slender, simple processes at both ends only. Shell as in *Littoridina.*

They are oviparous, thus differing from *Lyrodes.*

References to *L. tenuipes* follow:

Amnicola tenuipes Couper, 1844, in Haldeman's Monograph of the Freshwater Univalve Mollusca of the United States, part 7, 4th page of cover. Haldeman, 1845, same work, part 8, p. 23, pl. 1, figs. 14.

Bythinella tenuipes Couper, Binney, 1865, Land and Freshwater Shells of N. A., III, p. 69 (copied from Haldeman).

The shell is perforate, oblong-conic, thin, very glossy, light brown or yellowish-brown, composed of nearly 5 whorls, which are much *less convex* than usual in amnicolid shells; the upper whorls are more convex than the last two. The suture is not deeply impressed, and often shows a margin below, due to transparence. The aperture is ovate, angular above. Peristome thin, appressed to the preceding whorl for a considerable distance above the umbilicus.

Length 3.75, diam. 2 mm.; 5 whorls.

Length 4.1, diam. 2.2 mm.; 5½ whorls.

Length 4.3, diam. 2.1 mm., aperture 1.6 mm.; 5⅔ whorls. Pierpont.

Distribution: Lower Hudson Valley, New York, to Florida. Type locality, Hopeton (old name of a plantation on the Altamaha River five miles above Darien, Georgia), in rice-field ditches.

L. tenuipes differs from *Fontigens* and other amnicolids of the United States by its far less convex whorls and less impressed suture. The surface has an oily luster when clean, but it is often incrusted.

The foot is longer and more slender than in *Amnicola limosa,* pale gray, lighter in front and near the tail; back a little darker gray. Rostrum very dark gray, black in some specimens when contracted. The tentacles are extremely long, the ends rather blunt, very pale gray with opaque white flecks, and sometimes a darker gray band near the ends. The anterior auricles of the foot are highly mobile, sometimes stretching out like tentacles. Eyes as in *Amnicola.*

The verge is attached in the middle of the back. It is long, fleshy, gray, with a group of five long, white processes near the

base and about six long and several short ones near the distal end.

The central tooth is rather long, with two basal denticles on each side, the outer one smaller. The outer marginal tooth has a very broad shaft. Formula of denticles $\frac{414}{2\ 2}$, 7, 20, 18. The denticles upon the outer marginal tooth are decidedly larger than in *Fontigens nickliniana*. In the figures the lateral teeth are shown detached and partially prostrate, the cusps foreshortened. The radula figured is from one of Haldeman's cotypes.

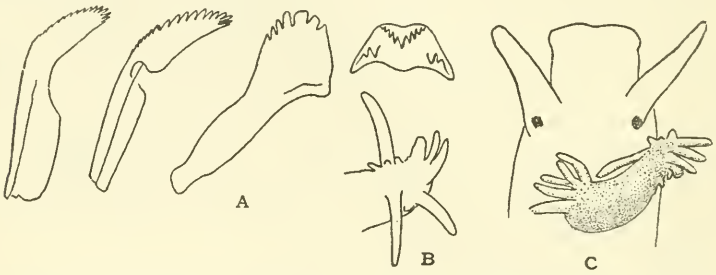

Fig. 2. *L. tenuipes*. A, teeth. B, end of verge from below. C, head with verge.

The animal is quite sprightly, moving rapidly and often whisking about. They crawled freely out of the water on the sides of a dish in which they were confined. They appear more animated than any other amnicolid snail I have kept alive. Females predominate; thirty-six were examined before finding the first male. The lot kept alive was from Chester River, Maryland.

The description of the shell is from one of Haldeman's specimens, drawn in fig. 1 F. Most other shells examined are "corneous" rather than light brown. Some of the New York specimens described below are not wholly typical, but those from Hackensack, N. J., agree perfectly with the types in shape. The largest is scarcely 4 mm. long. Everywhere the species is dimorphic, slender and stouter specimens occurring together. This is not a sexual difference in the lot opened.

At Hastings-upon-Hudson Mr. Billups collected specimens at two stations which differ from those of other localities in various details, as follows.

L. tenuipes large form. Fig. 1 D. The shell is larger than typical *tenuipes,* convexity of the earlier whorls conspicuous, whorls more numerous; pale yellowish brown or corneous brown.

Length 5.2, diam. 2.5 mm., length of aperture 2 mm.; 6½ whorls.

Length 5, diam. 2.6 mm.; 6 whorls.

L. tenuipes small form. Fig. 1 E. The shell is decidedly smaller than *tenuipes,* brown, glossy with the whorls a little more convex and the aperture somewhat wider than in *tenuipes.* Length 3, diam. 1.8 mm.; 5 whorls.

These smaller snails probably lived in a bog. They have a ferrous incrustation, while the larger form is almost clean, and doubtless came from another station. They are probably ecologic varieties.

Localities in the northern states from which specimens have been examined follow:

NEW YORK: Hastings-upon-Hudson, Westchester Co. (A. C. Billups). Piermont, Rockland Co. (Henry Fowler).

NEW JERSEY: Hackensack River, Hackensack (A. H. Gardner).

DELAWARE: Bohemia (Haldeman). Augustina Park, in a brackish ditch (John A. Allen).

MARYLAND: Banks of Chester River, Queen Anne Co., opposite Chestertown (E. G. Vanatta). Chesapeake Bay at Betterton, under stones at low water, with *Mytilopsis leucophaeata* and *Goniobasis virginica,* in slightly (and variably) brackish water (Pilsbry).[2]

It has also been reported, with a mark of doubt, from small lakes south of Mohawk, N. Y. (Lewis, Proc. A. N. S. Phila., 1860, p. 18), but the identification was evidently erroneous, as the name was omitted from later lists by the same author. DeCamp's record of *tenuipes* from Michigan has been considered an incorrect identification by later Michigan malacologists. An old (1904) record of *tenuipes* var. from Eve's Pond, Bermuda (Nautilus 17: 126) needs verification.

In part of the stations recorded above, the water is more or less brackish, at least during part of the year. In Maryland Mr.

[2] The salinity was not tested when the author was there many years ago, but the blue crab was abundant (and delicious!), and small barnacles were seen on piles.

Vanatta found it abundant on sandy, grassy inter-tidal shores of Chester River, where the water is somewhat brackish, living on the slimy tidal debris, out of water and exposed to the sun at low tide. Some of the South American Littoridinas are said to live in both fresh and brackish water.

At Piermont, N. Y., Henry Fowler found *L. tenuipes* in a small, marshy stream flowing into the Hudson, but in fresh water, above tidal influence, and associated with *Planorbula* and purely fresh water crustaceans.

CHECKLIST OF NEW JERSEY LAND SNAILS

By ROBERT C. ALEXANDER

Comparatively little study has been made of the land snails of New Jersey. The few papers published on the subject have been limited to records from specific localities in the state and, in one instance, a county. I do not know of any publication devoted to the land snails of the entire state.

A striking feature of the New Jersey land snail fauna is the presence of typically northern species living in association with typically southern species. This anomalous combination of species can be explained by the fact that New Jersey is located on the central part of the Atlantic coast where some northern species approach the southern limit of their distribution and some southern species reach the northern limit of their distribution. Certain species belonging to these diverse elements can be found together only in this state. Botanists have found that this condition is even more pronounced in the flora of the state. It is discussed at length in "The Plants of Southern New Jersey" by Witmer Stone (N. J. State Museum Report for 1910, pt. 2, pp. 47–99).

A line of island beaches, separated from each other by ocean inlets and from the upland by broad salt marshes and a system of waterways, extends along the New Jersey coast from Manasquan Inlet south to Cape May forming a barrier between the ocean and the mainland. Species representing the northern and southern faunas are generally found together on these beaches bordering the ocean and in isolated thickets and small wooded

areas in the salt marshes behind the beaches rather than in the interior of the state. Dr. Henry A. Pilsbry collected such northern species as *Pupilla muscorum* and *Cionella lubrica* in copses in the salt marshes behind Ventnor, just south of Atlantic City, in 1911. With them he found *Vallonia perspectiva,* a southern species never before reported from New Jersey or any other point on the Atlantic coastal plain (Nautilus 25(3) : 35). The particular copses where these specimens were collected were destroyed when the salt marshes here were filled in and leveled for building construction. The native vegetation and animal life have met a similar fate wherever a seashore resort has been developed on the barrier beaches.

Probably new species of land snails are to be found in New Jersey but trying to discover a new species here is like looking for the proverbial needle in the haystack. To my knowledge, no new species of land snail has been found in the state since Dr. Pilsbry discovered *Quickella vagans,* one of the Succineidae, at Cape May Point in August, 1898 (Nautlius 14(7) : 74). Most of the land snails that have been found in New Jersey are widely distributed outside of the state. Consequently, even when a species is found that is a new record for the state, almost certainly the species will not be new to science. It will be a species that has already been discovered somewhere else. Collectors whose purpose is the discovery of new species can do their collecting in many other states with the assurance that their chance of success will be far better than it would be in New Jersey.

Seventy-four species and subspecies of land snails, native and introduced, are listed in the checklist. This is considerably less than the number of species and subspecies collected in the six states tabulated below in which comprehensive studies have been undertaken.

State	Species	Authority	Date
Alabama	185	Walker	1928
Illinois	122	F. C. Baker	1939
Indiana	100	Daniels	1915
Michigan	103	Winslow	1926
Ohio	105	Sterki	1907
Pennsylvania	102	Brooks	1931

This discrepancy in number of different species can be attributed in part to the relatively small amount of collecting that has been done in New Jersey compared to that done in these other states. The land snail collection at the Academy of Natural Sciences of Philadelphia, which served as the basis for this checklist, contained very few records from Essex, Hudson, Hunterdon, Middlesex, Monmouth, Ocean, Salem, and Somerset Counties, and no records at all from Passaic and Union Counties. Obviously, this is due to the incompleteness of the collection rather than to the fact that few or no snails inhabit these counties. However, even with a great deal more collecting, the number of different species of land snails found in New Jersey probably would not equal the totals from these other states where conditions are, on the whole, more favorable for their existence.

The checklist gives the distribution of species and subspecies in New Jersey by counties. The land snail *Triodopsis albolabris maritima,* a sand dune form no longer regarded as a valid subspecies by Dr. Pilsbry (Land Mollusca of North America, vol. 1, pt. 2, p. 835), has been retained in the checklist as a matter of record. Introduced species in the checklist include: *Cecilioides aperta, Oxychilus cellarium, Oxychilus draparnaldi, Oxychilus alliarium, Triodopsis fosteri,* and *Cepaea nemoralis. Vallonia, pulchella, Vallonia excentrica,* and *Vallonia costata* are indigenous both to Europe and North America. Specimens of these species of *Vallonia* collected in New Jersey are presumably native unless there is evidence to the contrary.

Information about the slugs inhabiting New Jersey is inadequate for a detailed report on their distribution, so they have been omitted from the checklist. However, the following species and subspecies appear to be fairly common and widespread in the state: *Limax maximus, Limax flavus, Deroceras reticulatum, Deroceras laeve, Philomycus carolinianus* and *Philomycus carolinianus flexuolaris.* The first three are of European origin; *Deroceras laeve* is considered to be indigenous both to Europe and North America; and the last two are native to North America.

All species and subspecies included in the checklist are described and illustrated in "Land Mollusca of North America"

Distribution for New Jersey by Counties

Counties	Atlantic	Bergen	Burlington	Camden	Cape May	Cumberland	Essex	Gloucester	Hudson	Hunterdon	Mercer	Middlesex	Monmouth	Morris	Ocean	Passaic	Salem	Somerset	Sussex	Union	Warren
Cepaea nemoralis			X																		
Stenotrema hirsutum										X	X								X		X
Stenotrema fraternum		X								X	X			X					X		X
Mesodon thyroidus	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X		X		X
Triodopsis tridentata		X	X						X	X	X										X
T. tridentata juxtidens			X							X				X				X	X		X
Triodopsis fallax				X				X													
Triodopsis notata		X								X											
Triodopsis fosteri			X					X													
Triodopsis albolabris		X	X	X	X			X			X	X	X	X			X		X		X
T. albolabris maritima	X				X																
Cecilioides aperta											X										
Haplotrema concavum			X								X							X			
Euconulus fulvus				X																	X
Euconulus chersinus	X			X										X					X		
Guppya sterkii						X													X		X
Oxychilus cellarium					X								X								
Oxychilus draparnaldi				X																	
Oxychilus alliarium							X														
Retinella electrina			X	X	X			X											X		X
Retinella burringtoni			X	X		X		X						X					X		X
Retinella rhoadsi								X			X								X		X
Retinella indentata	X		X	X	X	X		X						X	X				X		X
Mesomphix inornatus											X										
Mesomphix cupreus																			X		X
Hawaiia minuscula	X		X	X	X	X		X											X		X
H. minuscula alachuana				X																	
Ventridens suppressus			X	X	X	X		X			X								X		X
Ventridens ligera			X	X	X			X													
Zonitoides arboreus	X	X	X	X	X	X		X			X	X	X	X	X			X	X		X
Striatura exigua					X																
Striatura meridionalis	X		X	X	X	X															
Striatura milium														X							X
Anguispira alternata		X	X	X	X						X			X					X		X
A. alternata fergusoni		X	X	X																	
Discus cronkhitei			X	X											X				X		X
D. c. catskillensis			X																X		X
Helicodiscus parallelus	X		X	X	X	X		X			X			X	X				X		X
Helicodiscus singleyanus				X																	
H. singleyanus inermis	X		X	X				X													
Punctum minutissimum			X	X	X	X		X											X		X
Punctum vitreum				X															X		X
Oxyloma decampi gouldi			X	X										X							X
Oxyloma effusa				X																	
Oxyloma effusa subeffusa			X	X																	

Counties	Atlantic	Bergen	Burlington	Camden	Cape May	Cumberland	Essex	Gloucester	Hudson	Hunterdon	Mercer	Middlesex	Monmouth	Morris	Ocean	Passaic	Salem	Somerset	Sussex	Union	Warren
Succinea ovalis		X	X	X	X			X		X	X			X					X		X
Succinea aurea	X				X	X									X						
Succinea avara			X	X	X	X		X													X
Quickella vagans				X	X																
Strobilops labyrinthica	X		X	X	X	X		X							X			X			X
Strobilops affinis																					X
Strobilops aenea			X																		
Gastrocopta armifera			X	X															X		X
Gastrocopta contracta	X		X	X	X	X		X									X		X		X
Gastrocopta pentodon	X		X	X	X	X		X							X				X		X
Gastrocopta tappaniana			X		X																X
Gastrocopta corticaria				X															X		
G. pellucida hordeacella					X																
Pupoides albilabris	X		X	X	X	X		X									X				X
Pupilla muscorum	X																				
Vertigo milium	X		X	X	X														X		X
Vertigo morsei																					X
Vertigo ovata			X		X			X			X										X
Vertigo pygmaea			X		X																X
Vertigo tridentata				X							X										
Vertigo gouldi												X							X		X
Columella edentula				X		X															
Vallonia pulchella				X	X		X					X					X				
Vallonia excentrica	X		X	X	X	X		X			X	X					X				
Vallonia costata	X																				
Vallonia perspectiva	X																				
Cionella lubrica	X		X		X														X		
Carychium exiguum			X	X	X			X													X
Carychium exile				X				X											X		X

by Dr. Pilsbry, which also gives numerous locality records for New Jersey. The nomenclature and systematic arrangement of species used in that work have been followed here.

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THE PUBLICATION DATES OF KOBELT'S "ILLUSTRIERTES CONCHYLIENBUCH"

By HARALD A. REHDER *

In publishing his "Illustriertes Conchylienbuch," W. Kobelt hoped to place into the hands of the average collector an illustrated handbook that would give him a guide to arranging his collection, as well as an aid in identifying the commoner shells in his possession. He also intended it to be of use to the more serious student by including, with brief descriptions, all the important genera and subgenera of mollusks, which he illustrated by depicting on 112 plates 2,354 species, all the very good figures being drawn by his own hand. Besides those species figured others are mentioned and briefly diagnosed in the text.

The principal importance of Kobelt's work today lies in the fact that he cited types for many, though not all, of the genera and subgenera mentioned in his handbook. These type designations have commonly been overlooked and many of them antedate those of Cossmann, Harris, and others.

Neither of the two volumes into which this work is divided bears a date on the titlepage. In fact, the only date given anywhere is that of the introduction, where March 1878 is cited. Because of its importance as a source of type designations, it is necessary to establish the publication dates of the different

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parts of this work. These dates, as far as I have been able to discover, are those given in the following table. Most of this information was obtained from the pages of the Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft. The last column lists the monthly number of the Nachrichtsblatt in which the part was reviewed (usually only briefly noted).

Part	Pages	Plates	Date	Reviewed
		Volume 1		
1	1–40	1–10	1876	Nov. 1876 [1]
2	41–64	11–20	1877	Nov.–Dec. 1877 [2]
3	65–88	21–30	1878	Feb.–March 1878
4	89–104	31–40	1878	May 1878
5	I–XVI, 105–144	41–50	1878	May 1878
		Volume 2		
6	145–176	51–60	1879	June–July 1879
7–8	177–264	61–80	1879 [3]	
9	265–312	81–90	1880	Sept.–Oct. 1880
10	313–344	91–100	1881	April 1881
11	345–392	101–112	1881	Oct. 1881 [4]

A PRELIMINARY LIST OF THE MOLLUSCA OF HANOVER COUNTY, VIRGINIA

By JOHN BAYARD BURCH

Randolph-Macon College

Hanover County, situated just east of the center of Virginia, has an area of 471 square miles. Its extreme length from east to west is approximately 37 miles, 12 miles of which lie within the Piedmont Plateau. The county comprises two main physiographic divisions: the Piedmont Plateau in the western half, and the Coastal Plain in the eastern. The Coastal Plain division has an altitude of about 250 feet on the west and 175 feet on the east. The Piedmont Plateau division slopes slightly from east to west, having a drop of 50 to 100 feet in elevation. Hanover

[1] Noted as received by library of society in issue of Jan. 1877.

[2] Noted as received by library of society in issue of August 1877.

[3] Date obtained from Zoological Record for 1879.

[4] Publisher's announcement of completion and availability of work in issue of June 1881.

County is well drained by the North Anna, Little, New Found, Pamunkey, Chickahominy, and South Anna Rivers. Seven soil types are represented by the collections, the most common being Meadow, Norfolk Sandy Loam, and Leonardtown Loam.

Very little has been published on the molluscan fauna of Virginia and only one species of mollusk has been recorded in the literature from Hanover County, this being *Helisoma anceps* (Menke), a fresh-water gastropod, reported by F. C. Baker in 1945 in his monograph *Molluscan Family Planorbidae*. Dr. Henry A. Pilsbry does not mention Hanover County in his monumental *Land Mollusca of North America*.

The Mollusca are represented in Hanover County by the Classes Gastropoda (snails, slugs, and limpets) and Pelecypoda (mussels and pillclams), each of which is represented by two orders. Since January, 1951 fifty collections from twenty-two localities have been made. Forty-four species and subspecies representing seventeen families have been determined.

The occurrence of mollusks in this county seems to depend not on type of soil or elevation but on access to calcium-bearing compounds, moisture, and cover.

Systematic Catalogue of Species

Class Gastropoda

1. FAMILY VIVIPARIDAE

Campeloma decisum (Say) 132 specimens from 4 stations

2. FAMILY PLEUROCERIDAE

Ceriphasia virginica (Gmelin) 233, 3 stations

3. FAMILY PLANORBIDAE

Helisoma anceps (Menke) 62, 3 stations

Gyraulus hirsutus (Gould) 78, 4 stations

4. FAMILY LYMNAEIDAE

Pseudosuccinea columella (Say) 74, 3 stations

5. FAMILY ANCYLIDAE

Ferrissia kirklandi (Walker) [1] 26, 1 station

Ferrissia shimekii (Pilsbry) [2] 10, 2 stations

6. FAMILY PHYSIDAE

Physa heterostrophia (Say) 31, 5 stations

Physa integra (Haldeman) 37, 3 stations

[1] First report of occurrence in Virginia, except manuscript of Dr. P. R. Burch.

[2] First report of occurrence in Virginia.

7. FAMILY PUPILLIDAE
Gastrocopta armifera (Say) 52, 1 station
Gastrocopta contracta (Say) 2, 1 station
Gastrocopta procera mcclungi (Hanna and Johnson) 4, 1 station
Pupoides albilabris (Adams) 2, 1 station
Vertigo ovata (Say) 3, 1 station
8. FAMILY ENDODONTIDAE
Anguispira alternata angulata (Férussac) 7, 3 stations
Helicodiscus parallelus (Say) 61, 8 stations
9. FAMILY VALLONIIDAE
Vallonia excentrica (Sterki) 17, 1 station
10. FAMILY PHILOMYCIDAE
Philomycus carolinianus (Bose) 23, 5 stations
11. FAMILY LIMACIDAE
Deroceras laeve (Müller) 21, 2 stations
Limax marginatus (Müller) 12, 2 stations
Milax gagates (Draparnaud) 8, 1 station
12. FAMILY ZONITIDAE
Euconulus chersinus (Say) 4, 2 stations
Euconulus fulvus (Müller) 7, 1 station
Hawaiia minuscula (Binney) 11, 2 stations
Retinella indentata (Say) 20, 4 stations
Retinella indentata paucilirata (Morelet) 24, 6 stations
Striatura milium (Morse) 2, 1 station
Ventridens ligera (Say) 5, 3 stations
Ventridens gularis theloides (Pilsbry) [3] 62, 6 stations
Zonitoides arboresus (Say) 148, 9 stations
13. FAMILY STROBILOPSIDAE
Strobilops aenea (Pilsbry) 18, 2 stations
Strobilops labrynthica (Say) 8, 2 stations
14. FAMILY HAPLOTREMATIDAE
Haplotrema concavum (Say) 17, 6 stations
15. FAMILY POLYGYRIDAE
Mesodon thyroidus (Say) 37, 6 stations
Stenotrema hirsutum (Say) 9, 4 stations
Triodopsis albolabris (Say) 26, 4 stations
Triodopsis fallax (Say) 181, 5 stations
Triodopsis tridentata juxtidens (Pilsbry) 13, 4 stations

Class Pelecypoda

16. FAMILY SPHAERIIDAE
Musculium rosaceum (Prime) [1] 133, stations
Pisidium strengi (Sterki) 15, 1 station

[3] I was unable to find *Ventridens cerinoides,* the Coastal Plain form, or *V. suppressus,* the Piedmont form, but only the intermediate *V. gularis theloides.*

Pisidium virginicum (Gmelin) 39, 2 stations
Sphaerium simile (Say) 17, 2 stations
17. FAMILY UNIONIDAE
Elliptio complanatus (Dillwyn) 37, 3 stations
Elliptio fisherianus (Lea) 9, 3 stations

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A STUDY OF LAMARCK'S TYPES OF UNIONIDAE AND MUTELIDAE

By RICHARD I. JOHNSON

With one exception, all the Unionidae and Mutelidae described by Lamarck are to be found in his famous Histoire Naturelle des Animaux sans Vertèbres. In Lamarck's time there was no ban upon a curator having a private cabinet; hence we find Lamarck referring to his own collection and that of the Paris Museum. Upon the death of Lamarck, his private collection was sold to Prince Masséna. It was later purchased by Baron B. Delessert who illustrated many of the types in a sumptuous publication. Later the Delessert collection became the property of the Musée d'Histoire Naturelle de Genève where it is still located. The remainder of the material on which Lamarck worked is, for the most part, in the Musée National d'Histoire Naturelle in Paris. Some few species were described from specimens in other cabinets.

In both museums, Lamarck's collection is kept separate from the main collection, thus facilitating its study. The specimens are mounted on cardboard plaques, generally with Lamarck's original label on the back. An example of the type of mount can be seen in Archives du Muséum National d'Histoire Naturelle [Paris] 1930, Series 6, **6**, Plate following p. 62.

Most of the species are known only from a single example. Where there were paratypes, these have been noted. In some cases there are examples in both museums. Lamarck sometimes refers to figures in the Encyclopédie Méthodique of Bruguière but in none of the observed cases was his specimen the one figured in this work.

My thanks are due to Drs. G. Mermod in Geneva and Dr. G. Ranson in Paris who have shown me every kindness and aid in repeated visits to their institutions to ascertain the whereabouts of the various types. Dr. Mermod has begun a careful illustrated study of the Lamarck types in the Musée de Genève, and we hope that this study will help him as well as others who are interested in Lamarck's types. Finally thanks are extended to Mr. W. J. Clench of the Museum of Comparative Zoölogy for his ever willing aid and suggestions.

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The Unionidae and Mutelidae described by Lamarck, including their present synonymy.

angusta, Unio: 1819, An. sans Vert. **6**, p. 80, No. 42 (Habite . . .). Holotype in the Paris Museum. Consists of one valve. Length 61 mm. Is *Unio pictorum* L.

anodontina, Unio: 1819, An. sans Vert. **6**, p. 80, No. 47 (Habite dans la Virginie). Holotype in the Geneva Museum. Length 60 mm. Is *Lamellidens marginalis* Lamarck.

australis, Unio: 1819, An. sans Vert. **6**, p. 80, No. 46 (Habite à la Nouvelle Hollande [rapporté par Perouse et Lesueur]). Holotype in the Paris Museum. Length 55 mm.; also one Paratype. Length 48 mm. Is *Hyridunio australis* Lamarck, see Iredale, 1934, Australian Zoologist **8**, Pt. 1, p. 69.

avicularis, Hyria: 1819, An. sans Vert. **6**, p. 83, No. 1 (Habite . . .) 1841, Delessert, Rec. Coq. pl. 12, fig. 6. Figured holotype in the Geneva Museum. Length 110 mm. Is *Prisodon obliquus* Schumacher.

brevialis, Unio: 1819, An. sans Vert. **6**, p. 73, No. 14 (Habite à L'Isle de France, M. Mathieu, Cabinet de M. Valenciennes). Holotype in the Paris Museum. Consists of one valve. Length 63 mm. Is *Unio littoralis* Lamarck.

carinifera, Unio: 1819, An. sans Vert. **6**, p. 74, No. 16 (Habite la rivière Hudson de l'état de New- York, Cabinet de M. Valenciennes). Holotype in the Paris Museum. Length 52 mm. Is *Elliptio complanatus* Solander.

clava, Unio: 1819, An. sans Vert. **6**, p. 74, No. 78 (Habite dans le lac Erie, Michaud fils). Should be in the Paris Museum, but could not be located. Is *Pleurobema clava* Lamarck, see Ortmann and Walker, 1922, Occ. Papers, Mus. Zoöl. Univ. of Michigan, No. 112, p. 25.

coarctata, Unio: 1819, An. sans Vert. **6**, p. 73, No. 11 (Habite la rivière d'Hudson, Cabinet de M. Valenciennes). 1 Cotype in the Paris Museum. Length 88 mm. One Cotype in the Geneva Museum. Length 78 mm. Lamarck gives no measurements in the original description. Is *Elliptio complanatus* Solander.

corrugata, Hyria: 1819, An. sans Vert. **6**, p. 82, No. 2 (Habite . . .). Lamarck refers to Ency. Method. 1797, pl. 247, fig. 2, a, b. Type in the Geneva Museum. Length 70 mm. Lamarck gives no measurements in the original description. Is *Hyria corrugata* Lamarck.

crassidens, Unio: 1819, An. sans Vert. **6**, p. 71, No. 3 (Habite l'Amérique septentrionale, dans le Mississippi, l'Ohio, et plusieurs lacs). Lamarck describes three shells and gives a measurement of 105 mm. for the type. This specimen could not be located. A polished specimen of lot (a) is in the Geneva Museum. It is from Mississippi. Lot (b) from Lake

Erie consists of one specimen measuring 66 mm. in length in the Paris Museum, and one in the Geneva Museum measuring 77 mm. Lot (c) could not be located. Is *Elliptio crassidens* Lamarck, see Ortmann and Walker, 1922, Occ. Papers, Mus. Zoöl. Univ. of Michigan, No. 112, p. 27.

crispata, Anodonta: 1819, An. sans Vert. **6**, p. 86, No. 7 (Habite . . . les régions australes? Du voyage de Baudin). Lamarck refers to Ency. Method. 1797, pl. 203, fig. 3, a, b. Holotype in the Geneva Museum. Length 51 mm. There is also a smaller paratype. There is another small paratype in the Paris Museum. Is *Glabaris crispatus* Bruguière.

delodonta, Unio: 1819, An. sans Vert. **6**, p. 77, No. 29 (Habite . . .). 1841, Delessert, Rec. Coq. pl. 12, fig. 7. The figured type is in the Geneva Museum. It measures 80 mm. in length. Lamarck gives the measurement as 76 mm. in the original description. Is *Diplodon lacteolus* Lea, see Simpson 1914, Des. Cat. Naiades **3**, p. 1227.

depressa, Unio: 1819, An. sans Vert. **6**; p. 79, No. 38 (Habite dans les rivières de la Nouvelle Hollande), 1841, Delessert, Rec. Coq. pl. 12, fig. 5. Two paratypes in the Geneva Museum. The largest, measuring 38 mm., was figured by Delessert. The holotype Lamarck refers to as measuring 52 mm. in length is in the Paris Museum. In the Paris Museum is also a plaque on which are glued three additional specimens. All are larger than the specimen figured by Delessert. Is *Rugoshyria depressa* Lamarck, see Iredale, 1934, Australian Zoologist **8**, pt. **1**, p. 70.

elongata, Unio: 1819, An. sans Vert. **6**, p. 70, No. 2 (Habite dans les rivières de l'Angleterre, et probablement du nord de l'Europe). Two cotypes in the Paris Museum. Lamarck gives no measurements. The largest specimen measures 133 mm. in length. Is *Margaritana margaritifera* Linn.

exotica, Anodonta: 1819, An. sans Vert. **6**, p. 71, No. 12 (Habite . . . les rivières de l'Inde?), 1841, Delessert, Rec. Coq. pl. **13**, fig. 1. Holotype in the Geneva Museum. Length 148 mm. Delessert's figure is somewhat reduced. One paratype in the Paris Museum with the label, "de l'Amérique du Sud acheté de la vente de M. Faujas St. Frond." It measures 150

mm. in length. Is *Anodontites trapesialis* var. *exotica* Lamarck.

exotica, Iridina: 1819, An. sans Vert. **6**, p. 89, No. 1 (Habite . . . les rivières des climats chauds). Lamarck refers to Ency. Method. 1797, pl. 204, fig. 1, a, b. Holotype is in the Geneva Museum. Length 138 mm. Is *Iridina exotica* Lamarck.

fragilis, Anodonta: 1819, An. sans Vert. **6**, p. 85, No. 4 (Habite les Lacs de Terre-Neuve, M. Lapylaie), 1841, Delessert, Rec. Coq. pl. 13, fig. 2. Figured holotype in the Geneva Museum. Length 68 mm. There is also a single valve of a smaller specimen. There are two additional paratypes in the Paris Museum. Is a valid species and not a synonym of *Anodonta marginata* Say.

(*To be continued*)

EIGHTEENTH ANNUAL MEETING OF THE AMERICAN MALACOLOGICAL UNION

On August twentieth, 1952, eighty members and guests of the American Malacological Union gathered at the Museum of Comparative Zoology in Cambridge, Massachusetts, the occasion being the eighteenth annual meeting of the organization. It was the largest group ever to assemble for this yearly event, a fact which bears testimony to the ever-mounting public interest in malacology.

Mr. William J. Clench, curator of the Museum of Comparative Zoology, and Miss Ruth D. Turner, his able assistant, figuratively spread the welcome mat; indeed, "Welcome!" was the keynote of a most enjoyable three-day convention. Registration and all lecture sessions took place in the geology lecture hall, located on the first floor of the huge Agassiz Museum (of which the M. C. Z. is a component part) while the social events were held in the Mount Vernon room of the Commander Hotel, the official headquarters hotel of the convention.

The first of these was the annual dinner on the opening day, August 20th. For this occasion the tables bore bouquets of

garden flowers in vases of shells, and the place cards were printed with an amusing snail figure made from the acutal plate used to illustrate A. Binney's "Terrestrial Air-breathing Mollusks of the United States," Vol. 1, p. 83, 1851. Following the dinner, Dr. Richard Howard, Professor of Botany at Harvard University, spoke on "Jungle Housekeeping," an entertaining lecture illustrated by colored slides.

The following papers were read on Wednesday afternoon and at the Thursday morning session: "Distribution of Mollusks in the Gulf of Mexico," Thomas E. Pulley; "A Shell Collector in Tobago," Richard W. Foster; "New Federal Regulations on Importing Mollusks," R. Tucker Abbott; "New England Malacologists," Ruth D. Turner; "The Nudibranchs of New England," George M. Moore, "Some New Records for Naiades from Eastern North America," Herbert D. Athearn; "The Family Clausiliidae in West Africa," Joseph C. Bequaert; "The Ecology and Distribution of Lymnaea (Bulimnea) megasoma in Michigan," Henry van der Schalie; "Opportunities in Medical Malacology," R. Tucker Abbott; "The Buffalo Meeting," Margaret C. Teskey.

The business meeting opened the Thursday afternoon session, and the following officers were elected:

President, Dr. A. Byron Leonard
Vice-president, Dr. Joseph C. Bequaert
Secretary-Treasurer, Mrs. Margaret C. Teskey
Councilors-at-large, Mr. R. Tucker Abbott, Dr. Carlos G. Aguayo, Miss Ruth E. Coats, Miss Ruth D. Turner

It was announced that provision has been made whereby life membership may be purchased for the sum of $25. A resolution to change the name of the American Malacological Union to American Malacological Society was tabled until the next annual meeting.

These papers on Thursday afternoon closed the academic portion of the convention: "Trans-Panamic Distribution of the Mactridae," J. Lockwood Chamberlin; "Studies on the Family Planorbidae," Emile Abdel-Malek; "Taxonomy in Modern Biology," William J. Clench; "Aerial Orientation in Achatina," J. Lockwood Chamberlin; "Using Sea Shells as Occupa-

tional Therapy Material in Mental Hospitals," Merrill Moore; "The William F. Clapp Laboratories," Ruth D. Turner.

At 6:00 Thursday evening the delegates were entertained by General Frank R. Schwengel and Retiring President Jeanne S. Schwengel at a cocktail and buffet supper party. Dull care was checked at the door, and the affair was thoroughly enjoyed.

The Friday field trip was the concluding feature of one of the most successful meetings the A.M.U. has ever enjoyed. Several private cars made the thirty-five mile trip to the William F. Clapp Marine Laboratory at Duxbury, Mass., where visitors were conducted through this unique establishment by members of the staff. Much of the research carried on is concerned with boring and fouling mollusks, and conclusions arrived at in this place are reported and acted upon around the world.

Following a picnic lunch, the party split according to individual desires; one group paid a brief visit to the marine biological station at Woods Hole, another departed to collect Unionidae at a nearby fresh water pond, while yet a third elected to "comb" at Duxbury Beach.

The place of the 1953 meeting has not as yet been decided upon, but will be announced in the report bulletin.

MARGARET C. TESKEY, *Secretary*

NOTES AND NEWS

PECTEN (PLAGIOCTENIUM) GIBBUS PORTUSREGII, new name.—Leo G. Hertlein, of the California Academy of Sciences, has just informed me that the term *carolinensis,* proposed for a new subspecies of Pectinidae, Nautilus, Vol. 66 (1), p. 17, is preoccupied, Conrad having described *Pecten carolinensis* (Eocene of North Carolina) in 1875. Therefore the new subspecies has been designated *Pecten (Plagioctenium) gibbus portusregii,* after the type locality, Port Royal, South Carolina. The holotype has just been deposited in the United States National Museum.—GILBERT GRAU.

A HOLOSPIRA NEW TO THE UNITED STATES.—*Holospira yucatanensis* Bartsch, originally described from Mujeres Island, Yucatan, and later reported by Mr. R. J. Drake from Boquillas, northern Coahuila, was collected by Mr. C. D. Orchard three

miles southeast of Hot Springs, International Park, Brewster Co., Texas. The specimens appear to be quite typical. Two are shown in Plate 6, fig. 1 (in January number).

It is a smooth shell except for riblets on the last whorl, which is very shortly free in front. The aperture is nearly circular, with a reflected peristome. There is a columellar lamella within the penult whorl. The length of the Texan specimens is from 16.5 mm. with 12 whorls to 19.3 mm. with 12¾ whorls.

The original locality assigned was doubtless owing to an erroneous label as Mr. Drake has indicated.—H. A. P.

Notes on Fauxulus agulhasensis.—Where they were found at Cape L'Agulhas was halfway up the hill overlooking the sea, just outside the village. The ground is clayey mountain soil. They were picked off small bushes. Although it appears that a water sloot is in the immediate vicinity, this sloot was completely dry, being in the heart of summer when we were down there on holiday. They were in a small colony by themselves. We hunted high and low for others but could only find the few that we gathered in, some dead and others alive. There was no *Fauxulus capensis* seen in the immediate vicinity, although they are abundantly found at Cape L'Agulhas.—Letter to B. B. Baker from D. W. J. Ackermann.

A further note on the shells of Pyramid Lake.—In Nautilus 66: 16 f. I adduced certain ideas that tended to question the validity of the newly named *Pyrgulopsis nevadensis paiutica* Baily & Baily and *Physa lordi zomos* Baily & Baily. However, under the new rule of the International Commission of August 1948 (discussed by Abbott in Nautilus 64: 103), a place has been made for certain infra-subspecific names, among which the Baily & Baily names, the former perhaps more clearly than the latter, might gain validity. But objection must be taken to putting the new trivial names in the third position in the species names, since this position must be reserved for valid subspecific names only (cf. Richter: "Einführung in die zoologische Nomenklatur," Frankfurt a.M. 1948, pp. 102–103). Hence it might be possible to call these new forms *Pyrgulopsis nevadensis nevadensis paiutica* and *Physa lordi lordi zomos,* even though the use of the subspecific trivial name in this case would not be entirely unambiguous. It would appear that the

present observation poses the question of the proper treatment for infra-subspecific names if these are to be attached to species that contain no subspecies. The suggestion given above might be one answer.—Morris K. Jacobson.

"Liguus pictus Reeve" not extinct.—Tree snails of the genus *Liguus* are known for their ability to arise phoenix-like from the ashes of hammocks in which they have apparently been exterminated, but the discovery of a living specimen of *Liguus fasciatus solidus* color form *pictus* Reeve on Big Pine Key, Florida seems incredible. This form has been considered extinct for nearly fifty years. Previous records from Big Pine Key were apparently based on dead shells found on the ground. More recently fragments of shells of *pictus* were found in an old cemetery at Key West, Florida (McGinty & McGinty, Nautilus 60(2): 43–46, 1946).

The situation in which the snail was found in August, 1951, is a second growth hammock (xeric jungle hammock associes of the Florida Keys). The tree growth consisted mainly of scrubby poisonwood and wild sapodilla with a few scattered Jamaica dogwoods. A considerable understory of shrubs is present, but the rocky floor was nearly free of dead leaves. There were numerous indications of fires in the past, but no evidence of recent burning. No other tree snails nor shell fragments could be found anywhere in the vicinity.

The snail was taken alive to Michigan where Dr. Henry van der Schalie succeeded in taking several colored photographs and in extracting the animal for preservation. Shell and animal are now preserved in the collection of the Museum of Zoology, University of Michigan. Dr. William J. Clench kindly confirmed the determination, remarking "certainly *pictus* and a beautiful specimen."

While making photographs of the specimen Dr. van der Schalie observed that it would crawl at much lower humidities than specimens of *L. f. roseatus* color form *lossmanicus* Pilsbry from Key Vaca. This observation checks with the observations on the natural habitats in which the two forms were taken, the hammock on Big Pine Key being very open and dry.

The discovery of a living specimen of *pictus* throws doubt on the importance of population size as a factor in the extinction

of *Liguss* colonies (Young, *Occ. Papers Mus. Zool. Univ. of Mich.* (531) : 4, 1951). If a form can exist for over fifty years in populations so small that only one living snail has been recorded, it is possible that *any* colony can recover if left to itself. If any significant area of Big Pine Key can be preserved for the protection of the nearly extinct Key Deer, it is possible that *Liguus* of the color forms *pictus*, *graphicus*, and perhaps even *solidus* and *crassus* may eventually be rediscovered there.

I wish to thank Dr. Irving J. Cantrall, Dale Rice, Edward Mockford, and Larry Stieglitz for their assistance on the expedition which resulted in the rediscovery of *pictus*.—Frank N. Young, Indiana University. (Contribution No. 496 from Department of Zoology, Indiana University.)

PUBLICATIONS RECEIVED

Index to the Nautilus, volumes 35 to 60. Compiled by Aurele La Rocque, assisted by Geneva Smithe and Harold W. Harry. 332 pp., frontispiece portrait of Bryant Walker. University of Michigan Press, Ann Arbor, Mich. Price $5.00. This volume is uniform in style with the index to vols. 1 to 34. There are upwards of 30,000 references. The labor of compiling such an index and seeing it through the press can be appreciated only by those who have attempted similar work. A new and very useful feature is a list of obituaries. The authors are to be congratulated upon the appearance of this volume, indispensable to all who use The Nautilus. "Index learning turns no student pale, but holds the eel of science by the tail."—H. A. P.

Les Types de la Collection Lamarck au Muséum de Genève, III, by G. Mermod. Revue Suisse de Zoologie 59, No. 2. The present number of this valuable and interesting series contains the Lamarckian genera *Succinea, Auricula, Cyclostoma, Planorbis, Physa, Lymnaea, Melania* and *Ampullaria*. Many American species are figured and discussed. *Planorbis lutescens* Lamarck is apparently an *Australorbis* which has not been recognized by recent authors. *Lymnaea virginiana,* "dans les eaux douces en Virginie," is an Indian species.—H. A. P.

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OBSERVATIONS ON A LIVING SPECIMEN OF OCTOPUS HUMMELINCKI ADAM *

By GILBERT L. VOSS

Marine Laboratory, University of Miami

Adam (1937) described *Octopus hummelincki* from preserved specimens collected from the island of Bonaire, in the Dutch West Indies, and since that date several other papers have appeared describing in detail the morphology of this species. In none of these papers, however, are there any observations or comments upon living specimens. On July 26, 1952 a specimen of this species was collected by Donald R. Moore at Long Reef in the Florida Keys while on a class collecting trip with the author. In view of the rather unusual characters displayed by this specimen it was considered that these observations should be added to the literature along with the author's conclusions.

The specimen, a male with a mantle length of 30 mm., was discovered at the entrance to a hole beneath a slab of coral in about three feet of water. Immediately upon capture he was handed to the author who had an opportunity to observe closely his sculpture, coloration, movements and habitat.

The sculpture, when living, is so different from that of the preserved animal that it would scarcely be recognizable as the same species. Outstretched in the palm of the author's hand each individual cirrus, amounting to about 50 or 60 in number, was fully distended into a wide, flat blade or band about 8 to 10 mm. in length ending distally in an arborescent crest. The eyes were raised boldly above the head and accentuated by the prominent supraocular cirri. The arms, when at rest, were

* Contribution Number 81, from the Marine Laboratory, University of Miami.

held curled back over themselves with the sucker discs fully distended, adding to the irregular outline of the body. In general the entire surface is very rugose, especially on the dorsal portion of the body and arms. When swimming the cirri disappear, the rugosity of the skin itself smooths out, the arms point forward and adhere tightly together and the whole body is streamlined. Although the funnel is of normal size, this species appears to be a very active swimmer, much more so than the other octopi such as *O. vulgaris* and *O. briareus.*

The color and color patterns seem to be rather distinctive although coloration is so variable in the octopods that in general it is not used as a diagnostic character. At rest or crawling the basic color was a rich reddish yellow-brown upon which were superimposed mottlings of light golden yellow. At intervals this pattern changed to a lighter brown with granular mottlings of grayish white. When swimming the mottlings disappeared and the color was a uniform light brown.

In the water, which was stirred by wave action, the animal appeared to be covered by a dense growth of marine algae waving with the motion of the water. This effect was heightened by the reef being completely covered with a heavy growth of attached *Sargassum* or Gulf weed and scattered clumps of *Dictyota* having the same general color and appearance of the cirri. Unfortunately the field data of the other specimens of this species now in the literature fail to give any mention of the prevailing algal growth. However, both *Sargassum* and *Dictyota* are commonly found on old coral reef formations in Florida and the West Indies and it would be interesting to know if it were prevalent in the collecting areas from which this species has been taken. A small collection of eight specimens of *O. hummelincki* from Cay Sal Bank were taken from reefs having dense algal growth and a single specimen from Bimini, Bahamas, also was found surrounded by *Sargassum.* The striking coloration and general appearance of this species of octopus closely resembles that of the well-known Sargassum fish *Histrio histrio* as was noted by all of the observers present.

It is the opinion of the author that *O. hummelincki* is restricted to those reefs of coral origin now overgrown with *Sargassum, Dictyota,* and other genera of the brown algae and

is peculiarly adapted among the octopoda to this floral habitat, similar to the close associations found in the drifting *Sargassum* complex, a field of study of great interest to marine biologists due to the adaptations found within it. The first color pattern noted corresponds in a striking degree to the colors exhibited by the surrounding algae and the granular grayish-white mottlings of the second phase imitated the white calcareous sedimentation found in small areas throughout the reef.

The specimen when preserved in 5 percent formalin immediately contracted the cirri into minute, filiform structures hardly noticeable except over the eyes, and the body changed in color to a mottled reddish-brown. In every way the specimen, preserved, resembled the other specimens described in the literature or in the possession of the author.

A few remarks on the ocellus of this species seems pertinent. Adam, Rees and Pickford variously described the ocellus of the specimens examined by them as consisting of a somewhat circular patch of brown or dark slate gray separated from a dark reddish-brown, brown, or gray center by a thin pale, black, or dark ring. Voss (1949) described the ocellus of the only other known Florida specimen as "a grayish-black ring surrounding a dark gray disc." These descriptions are extremely confusing and, in the light of examinations, made by the author of about ten specimens from the Bahamas and Florida, are erroneous.

Actually the ocellus consists of a reddish-brown irregular splotch within which is a narrow to broad band forming a more or less circular ring which both in life and in freshly preserved animals is colored a most intense purplish-blue. In life this may fluctuate from a pale blue to the deep color mentioned, apparently at the will of the animal. Specimens more than two years in preservative still retain this color. Any assumptions as to the use or value of this organ is dangerous, but the author cannot but point out that in an animal with such a high degree of mimicry it may well function as a means of recognition.

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MUREX BICOLOR VALENCIENNES IN FLORIDA

By MARGARET M. TEARE

While spending the winter of 1943–44 in St. Petersburg, Florida my sister and I discovered that the beach along the south side of Shore Acres (a subdivision of St. Petersburg) was a very productive shelling station at low tide.

Just beyond the bridge which connects Snell Island and Shore Acres there was a narrow clearing off the main road which leads to Tampa Bay where we could park the car and walk about fifty feet to the beach. We never encountered any other collectors along that shore, but occasionally we would notice evidence that someone had been there.

Up the beach a short distance was an inlet the shores of which were quite rocky and the walking difficult because of the dead oysters and other shells. It was along this shore that one day I saw a shell which I had never collected in Florida, but it was deeply and firmly embedded among the broken shells and required considerable effort to remove. The greater portion of the shell is foveolate and gray from chemicals in the water or just plain old age. The fresh new growth which looks as though the animal had somehow gotten a new lease on life is not pitted

but pinkish white, the aperture pink; peristome is not chipped but the parietal callus while polished is chipped slightly.

When picked up the animal had withdrawn so far into the shell that I thought it was dead, but we placed it in our basket with the live shells, and upon arrival at our hotel we realized that the animal was very much alive. We boiled it, removed it from the shell and packed the shell with our other loot for shipment home. It was months after returning to Buffalo that I realized it was a *Murex bicolor* Val. (Plate 6, figs. 4, 5). The fact that this shell was found so far from its home in Panama, and the old and new growth, makes it a real oddity. The pictures accompanying this article were taken by Charles E. Simmons, staff photographer of the Buffalo Society of Natural Sciences.

FASTIGIELLA CARINATA REEVE, A LITTLE-KNOWN MOLLUSK

By H. A. PILSBRY

In the Proceedings of the Zoological Society of London for 1848 Lovell Reeve described a gastropod of unknown locality in the Cuming collection, under the above name. His account was illustrated by a good woodcut which we reproduce in Plate 6, fig. 3.

Reeve thought that it was intermediate between *Cerithium* and *Turritella*. H. & A. Adams, in their Genera of Recent Mollusca, placed the genus at first in Fasciolariidae, but in their second volume, p. 655, in Cerithiidae. Here it was left by Tryon (Man. Conch., 9: 149) and, with a question mark, by Thiele. It still remained known only by the single type specimen. The only recent reference to the species is that it was listed as "*Fastigiella* (*Cerithidea*) *carinata* Reeve" in A Complete List of Bahamian Shells collected and classified by the Bahamas Conchological Club, 1941–1944, p. 8, compiled by Paul Dean Ford. No locality was mentioned.

In 1877 (Journal de Conchyliologie, 25: 208) Mörch described as *Fastigiella poulsenii* a crab shell from Eleuthera collected by Dr. C. M. Poulsen. It is listed in Poulsen's Catalogue of West

India Shells in his collection, p. 9, no. 533 (Copenhagen, 1878). This shell measured 17 × 7¼ mm. It was not figured, but the description gives one the impression that it is merely the almost half-grown young of *F. carinata*.

In assorting a collection from Eleuthera made by Mr. A. J. Ostheimer III in 1951 a typical specimen of *F. carinata* was found. It is figured on Pl. 6, fig. 2, × nearly 1½. This specimen is "dead" and white but otherwise perfect. There are three narrow but strong spiral ridges on the whorls of the spire, seven on the last whorl, or ten at its end counting intermediate cords between the larger ribs, conspicuous only on the last half whorl though beginning weakly on the penult whorl. On the second to fifth whorls there are fine, close axial folds above the upper spiral. There is a conspicuous convex siphonal fasciole and a short, deep umbilical crease. The upper angle of the aperture is narrowly channelled. Length 36 mm., diameter 16 mm.; 11 whorls.

Unfortunately the operculum and soft parts are gone, so that Mr. Ostheimer's specimen does not help us to classify *Fastigiella* more exactly; but at least it tells us where to go to get the information needed. The exact locality of this specimen, no. 189519 ANSP., is Bottle Cay, one of the Schooner Cay group, west of Tarpum Head in southern Eleuthera.

THREE NEW SPECIES OF PHILOMYCIDAE

By LESLIE HUBRICHT

Pallifera varia, new species. Plate 7, figs. 1, 6.

Mantle dappled gray or brownish-gray. Tentacles dark slaty-blue. Margin of foot reddish-brown. Length up to 65 mm. when fully extended in crawling.

Jaw yellow to chocolate-brown, arcuate, with six to nine ribs.

Atrium extremely short, only reaching through the integument. Penis about one-third as long as the animal (preserved), interior with two non-papillose longitudinal channels. Spermathecal duct with the lower two-thirds greatly enlarged, larger than the penis, narrowing rapidly to a slender tube. Sperma-

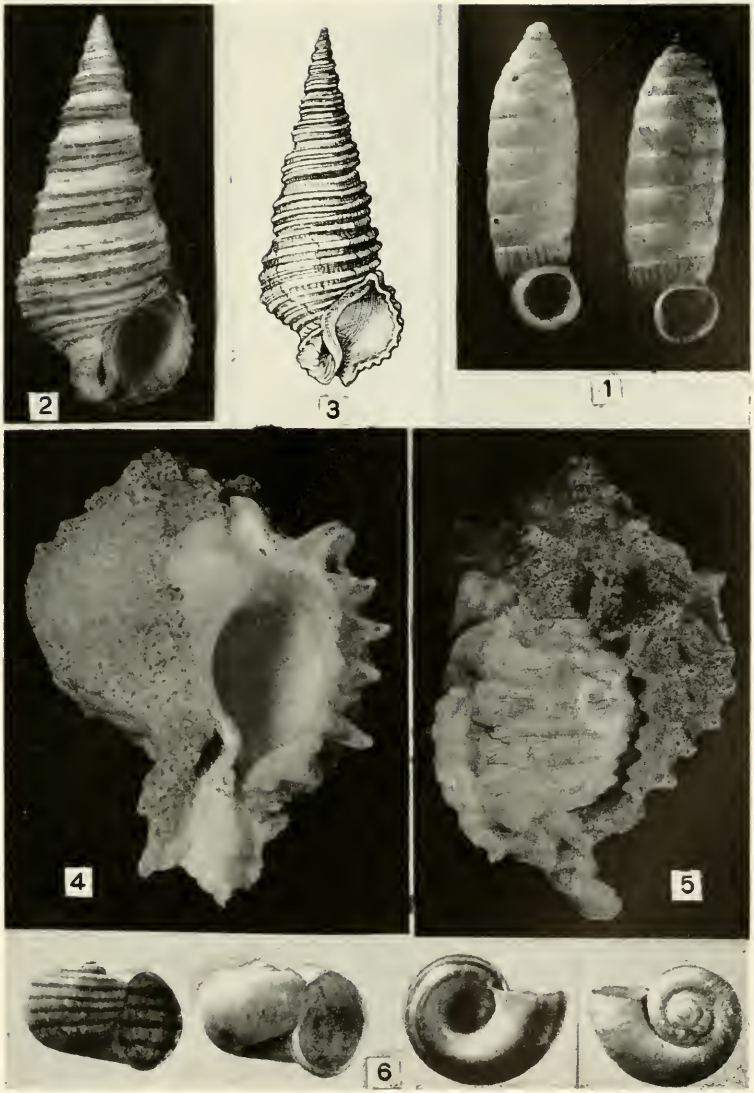

FIG. 1. *Holospira yucatanensis Bartsch* × 2, p. 69. FIG. 2. *Fastigiella carinata* Reeve × nearly 1½. FIG. 3. *Fastigiella carinata* after Reeve. FIGS. 4, 5. *Murex bicolor* Val. from Florida. FIG. 6. *Pomacea oligista*, slightly enlarged.

FIGS. 1, 6. *Pallifera varia*. 2, 5, *Philomycus virginicus*.
3, 4, *Philomycus venustus*.

theca globular. Vagina greatly inflated at the base into a large sac, suggesting the dart sac of *Philomycus* but containing no dart.

Pallifera varia is related to *P. dorsalis* (Binn.), differing in being larger, with a stronger dorsal pattern. In *P. dorsalis* the atrium is longer, and the penis has four non-papillose longitudinal channels.

Distribution.—VIRGINIA: Rappahannock Co. near Meadow Spring, Shenandoah Nat. Park. Madison Co.: woods, above Hemlock Spring Overlook, Shenandoah Nat. Park; near Skyland, Shenandoah Nat. Park, Holotype 574701 U. S. Nat. Mus., Paratype 189176 A.N.S.P., other paratypes 12164 collection of the author. Amherst Co.: summit of Tobacco Row Mtn., north of Elon. Rockbridge Co.: Thunder Ridge, Blue Ridge Parkway. Bedford Co.: Flat Top Mtn., Peaks of Otter, Blue Ridge Parkway.

PHILOMYCUS VENUSTUS, new species. Plate 7, figs. 3, 4.

Color pattern varying from individuals having two dorsal bands, a narrow lateral band on each side, connected to the dorsal bands by a series of oblique stripes; to individuals in which this pattern is broken up into a series of spots. Pattern dark gray in very young specimens, becoming dark chestnut-brown in mature individuals. Maximum length, extended in crawling, about 100 mm.

At Comers Rock, the type locality, this species was found associated with *P. flexuolaris* and was readily separated. It is more terrestrial than *P. flexuolaris.* Only occasionally being found on trees. Some specimens show two rows of spots down the back but the spots are brown, not black as in *P. carolinianus.*

Distribution.—WEST VIRGINIA: Randolph Co.: 4500 ft., Spruce Knob. VIRGINIA: Wythe Co.: 4000 ft., below fire tower, Comers Rock, Iron Mtns., Holotype 574700, U. S. Nat. Mus., Paratype 189459 A.N.S.P., other paratypes A9876, collection of the author. Grayson Co.: spruce swamp, 4800 ft., White Top Mtn., 5000–5500 ft., Mt. Rogers. Washington Co.: 1 mile south of Damascus; bluff along North Fork Holston River, 2 miles southeast of Hyters Gap. Wise Co.: summit of Black Mtn., at Va.—160. NORTH CAROLINA: Watauga Co.: 4500 ft.,

Rich Mtn., 2 miles south of Silverstone. Mitchell Co.: 5000 ft., Roan Mtn., 0.5 mile southeast of Carvers Gap. Swain Co.: near Smokemont Campgrounds, Great Smoky Mtns. Nat Park; Nantahala Gorge, near Nantahala. TENNESSEE: Sullivan Co.: Worley Cave Sink, 2.5 miles east of Bluff City. Carter Co.: 4000 ft., north side of Roan Mtn., 2.5 miles south of Burbank; Doe River bluff, 1 mile northwest of Hampton. Sevier Co.: near Chimneys Campgrounds, Great Smoky Mtns. Nat. Park.

Philomycus virginicus, new species. Plate 7, figs. 2, 5.

Color pattern consisting of a broad dorsal band, and a narrow lateral band on each side, connected to the dorsal band by a series of oblique stripes, the whole pattern obscured by a general fine flecking. Young with the pattern brownish-gray, becoming chestnut-brown with age. Maximum length, extended in crawling, about 100 mm.

Philomycus virginicus has been found associated with both *P. flexuolaris* (Raf.) and *P. carolinianus collinus* Hubricht and was readily separated. It differs from both in being browner and in having a well-developed diagonal pattern.

Distribution.—VIRGINIA: Madison Co.: 0.5 mile west of milepost 47, Shenandoah Nat. Park; near Skyland, Shenandoah Nat. Park, Holotype 574699, U. S. Nat. Mus., Paratype 189175. A.N.S.P., other paratypes 12163 collection of the author. Alleghany Co.: wooded hillside, near Griffith, 6 miles northeast of Cliffton Forge. Bedford Co.: Flat Top Mtn., Peaks of Otter, Blue Ridge Parkway. Pittsylvania Co.: bluff along Roanoke River, 3 miles northwest of Brights; bluff along Roanoke River, 2 miles northeast of Hurt. Patrick Co.: Kibler Park, below Pinnacles powerhouse.

MOLLUSKS FROM AN INTERGLACIAL DEPOSIT (SANGAMON ? AGE) IN MEADE COUNTY, KANSAS

By HENRY VAN DER SCHALIE

One of the interesting observations that has impressed most investigators who have examined mollusks taken from Pleistocene

deposits is the close similarity between many of the fossil forms and the species found in the area drained by the Mississippi River today. Some time ago two of the active students of the Pleistocene differed about the significance of the differentiation observed and in an article discussing these variations in time, B. Shimek (1930: 40) wrote:

"There is much variation in both modern and fossil faunas, but the two groups blend in such a manner that any attempt to represent marked changes is extremely unfortunate and misleading. Mr. Baker is making this attempt both by representing that well marked faunas have become extinct, and by the application of such names as *pleistocenica, yarmouthensis,* etc., without giving due heed to the variations in modern and fossil faunas."

The Pleistocene shells reported here are for the most part the same as those found inhabiting the general region of Kansas today. Practically all the more common land and fresh-water genera and species are represented. To date not a single endemic form has been discovered in the Jinglebob fauna among the material examined from Meade County. Differences found in these assemblages are related largely to shifts which have occurred in the patterns of distribution and there certainly are changes in the range of some of the species. By combining information concerning the ecological needs of some of these Pleistocene forms it is possible to reconstruct conditions which existed during that geologic age. The difficulty that arises in such an attempted reconstruction relates to the serious lack of sound information about limiting factors in the environment of the mollusks. Tolerance ranges are not known for most recent species. Until the ecology of key forms has been more critically analyzed most attempted appraisal of conditions during the Pleistocene will be in the realm of the uncertain.

The only previous account of the mollusks from this horizon in Meade County was contained in a paper by George C. Rinker (1949) describing the skull of a large bear. The mollusks found with that skull in the Kingsdown formation comprised 11 land shells, 10 fresh-water pulmonates, and 4 sphaeriids. An obvious error in that list (1949: 10) should be corrected, i.e., "*Physa arboreus* Say" should read "*Zonitoides arboreus* Say."

The fossil mollusks of Kansas have been studied in some detail by A. Byron Leonard. Two recent papers (1950; 1952) are of special interest in that the species reported in them are similar in some respects to those given here. Since the assemblages are well figured in Leonard's papers his illustrations can be used advantageously for reference work. Other investigators, such as Eisely (1937), LaRocque (1952), Russell (1934), Yen (1947; 1951), etc., have considered the use of fossil mollusks for interpretations of prehistoric conditions.

The following forty-nine species were found in the deposits investigated by C. W. Hibbard in Meade County, Kansas. This fauna has been designated by him as the Jinglebob local fauna. Its relation to other faunas in Meade County will appear in a paper by Hibbard, now in press, who tentatively correlates the fauna in age with the Sangamon. The mollusks in this fauna consist of 28 land shells (including one slug), 15 fresh-water snails (all pulmonates with one exception), and 6 sphaeriids. All of the material reported came from only three of the 80 pounds of concentrate recovered from the washers. Problems that relate to species in this assemblage and considerations of the fauna as a whole will appear following the presentation of the list of species.

SPECIES LIST INDICATING THE FOSSILS FOUND IN THE JINGLEBOB FAUNA IN PLEISTOCENE DEPOSITS OF MEADE COUNTY, KANSAS (COLLECTED BY CLAUDE W. HIBBARD AND PARTY)

	Number of Specimens Recovered
Polygyridae	
Stenotrema monodon (Rackett)	1
Zonitidae	
Euconulus fulvus (Müller)	20
Retinella electrina (Gould)	8
Retinella cf. *rhoadsi* (Pilsbry)	8
Hawaiia minuscula (Binney)	200
Zonitoides arboreus (Say)	40
Limacidae	

Deroceras cf. *aenigma* Leonard 30
Endodontidae
Helicodiscus parallelus (Say) 50
Punctum minutissium (Lea) (= *Punctum pygmaeum* (Drap.)) 35
Succineidae
Succinea ovalis Say 6
Succinea grosvenori Lea 100
Succinea cf. *avara* (Say) 20
Strobilopsidae
Strobilops texasiana (Pilsbry and Ferriss) 70
Pupillidae
Pupoides albilabris (C. B. Adams) (= *Pupoides marginatus* (Say)) 100
Pupilla blandi Morse 2
Gastrocopta armifera abbreviata (Sterki) 200
Gastrocopta contracta (Say) 100
Gastrocopta holzingeri (Sterki) 50
Gastrocopta pentodon (Say) 300
Gastrocopta cf. *tappaniana* (C. B. Adams) 1
Gastrocopta procera (Gould) 5
Gastrocopta cristata (Pilsbry and Vanatta) 200
Gastrocopta sp. (a small five-whorled form with stunted apertural teeth; the last whorl is decidedly striate) 1
Vertigo milium (Gould) 100
Vertigo ovata Say 150
Valloniidae
Vallonia parvula Sterki 50
Vallonia gracilicosta Reinhardt 150
Carychiidae
Carychium cf. *exiguum* (Say) 300

Pulmonates: Fresh-Water Snails

Lymnaeidae
Lymnaea bulimoides Lea 50
Lymnaea caperata Say (three specimens in this series have the spire and upper whorls suppressed and twisted in a peculiar way) 50

Lymnaea cf. *galbana* (Say)	20
Lymnaea humilis modicella (Say)	50
Lymnaea cf. *palustris* (Müller)	15
Planorbidae	
Helisoma anceps (Menke) (= *H. antrosa* (Conrad)	50
Helisoma cf. *lentum* (Say)	30
Menetus exacuous (Say)	50
Gyraulus similaris (F. C. Baker)	500
Physidae	
Physa cf. *anatina* Lea	30
Physa cf. *elliptica* Lea	100
Aplexa hypnorum Linnaeus	15
Ancylidae	
Ferrissia parallela (Haldeman)	5
Ferrissia rivularis (Say)	3

Operculates: Fresh-Water Snails

Valvatidae	
Valvata tricarinata Say	1

Bivalves

Sphaeriidae	
Sphaerium sulcatum (Lamarck)	30
Sphaerium occidentale Prime	8
Pisidium casertanum (Poli) (= *P. abditum* Haldeman)	500
Pisidium compressum Prime	50
Pisidium obtusale C. Pfeiffer (= *P. rotundatum*)	20
Pisidium contortum Prime	14

A comparison of these species with those reported by Leonard as belonging to the "Yarmouthian Molluscan Fauna" indicates that at least the following twenty-two species did not appear later in the Jinglebob assemblage in Sangamon time. This difference is especially noteworthy when it is realized that the Yarmouthian assemblage represents a fauna which lived under decidedly cool and generally different environmental conditions.

Valvata lewisi Currier
Amnicola limosa parva Lea
Pomatiopsis cincinnatiensis (Lea)
Lymnaea reflexa Say
Planorbula vulcanata Leonard
Planorbula nebraskensis Leonard
Menetus pearllettei Leonard
Gyraulus labiatus Leonard

Oxyloma navarrei Leonard
Cionella lubrica Müller
Vertigo tridentata Wolf
Vertigo modesta Say
Pupilla muscorum (Linné)
Gyraulus pattersoni F. C. Baker
Carychium perexiguum F. C. Baker
Gastrocopta proarmifera Leonard
Gastrocopta falcis Leonard
Vallonia pulchella (Müller)
Strobilops sparsicosta F. C. Baker
Discus cronkhitei (Newcomb)
Polygyra texasiana (Moricand)
Hendersonia occulta (Say)

The habitat requirements of the aquatic snails that were found in the Jinglebob fauna seem to indicate that the conditions during the Sangamon (?) interglacial were in some respects similar to those found in the "woods pool" regions of southern Michigan today. Such aquatic forms as *Lymnaea caperata, Lymnaea palustris, Menetus exacuous* and *Aplexa hypnorum* are all characteristically associated with temporary pools in lower Michigan at present.

Some of the land shells in the Jinglebob fauna are now more southern in distribution, indicating that perhaps conditions at that time in the Pleistocene were warm and moist. Both *Strobilops texasiana* and *Gastrocopta cristata* are at the present time farther south in range. As is also noticeable, both *Vallonia pulchella* and *Pupilla muscorum,* which now occupy a more northern range, are conspicuously absent. The land and freshwater forms suggest a warm and moist climate in a wooded region containing temporary woods pools.

The sphaeriids were determined by H. B. Herrington. His comments regarding the environment of the species are of interest in interpreting the conditions that existed at the time those animals lived. In a personal communication he stated:

"The impression I get on examining these shells is that they came from a situation where a slow stream is widening with lagoon conditions at its sides The *Sphaerium occidentale, Pisidium obtusale* and the thin *Pisidium casertanum* indicate a pond or a lagoon. But *Sphaerium sulcatum,* although always requiring a soft bottom, is never found in a pond that dries in summer. It belongs to eddies in streams and, sometimes, along the shores of lakes at a depth not much disturbed by wind action. *Pisidium compresum* I have never found in a stagnant pond.

"None of the specimens in this collection suggest wave action nor rolling by a swift stream, as none are worn. . . . If these lived in an enlargement of a stream the still water would be suitable for *Pisidium obtusale,* and the *Sphaerium occidentale* could have lived among the leaves and the grass along shore, or in a lagoon. The shell of these *Sphaerium occidentale* is of the thicker texture such as belongs to specimens from ponds and lagoons, rather than to swamps where there is no water action and where the shell is more fragile.

"There seems to have been two related kinds of habitats contiguous—running water where larger and heavier specimens of *Pisidium castertanum, Pisidium compressum* and *Sphaerium sulcatum* lived. The other habitat seems to have been something of the nature of a pond or lagoon where the water pretty well dries up for part of the year."

The interpretation above as based on sphaeriid ecology agrees essentially with what has been postulated to be the conditions which the associated aquatic snails would require. It is evident that the presence of an operculate, such as *Valvata tricarinata,* would require the presence of a body of water of a more permanent nature such as a ponded stream or small lake. Operculates are not found usually in woods pools. It is also of interest that *Valvata* occurred at that time in glacial history because its presence indicates a need for revising the following conclusion arrived at by Leonard (1952: 10): ". . . None of the genera of branchiate gastropods, such as *Amnicola, Pomatiopsis,* and *Valvata,* survived the Yarmouthian interglacial interval in the mid-continent region." Another statement needing modification in the light of what is contained in the Jinglebob fauna pertains to the pulmonates. Leonard (1952: 10) stated: ". . . Likewise, pulmonate gastropods, such as *Planorbula, Menetus, Promenetus, Ferrissia,* most species of *Gyraulus,* and large species of *Lymnaea,* failed to survive the ecological changes that followed the close of deposition of Sappa silts." Again the faunal list presented clearly indicates that *Ferrissia, Menetus* and *Gyraulus,* as well as sizeable lymnaeids, were not uncommon in Sangamon or the third interglacial age.

It is clear from the evidence adduced by Leonard in his account of the "Illinoian and Wisconsinan Molluscan Faunas in Kansas" that he believed there was a drastic reduction in the number of species that survived in the high plains after the

"Yarmouthian" interglacial age. His deduction (1952: 10) is clearly stated: "It is difficult to escape the conclusion that a profound change in ecological conditions in the Great Plains region occurred at the close of the Yarmouthian interglacial interval or at the beginning of the Illinoian cycle of erosion. Dramatic extinction of the great populations of branchiate and other gastropods adapted to life in permanent water, which thrived in western Kansas in late Kansan and early Yarmouthian times, is indicative of a less humid environment and of less alluviated valley systems in the Great Plains region." So rich and varied an assemblage of approximately fifty species in an age well beyond Yarmouthian time definitely indicates that with an accumulation of further evidence our concepts about conditions in the high plains during the Pleistocene will need to be modified as new evidence accumulates.

Leonard (1952: 27–35) presented a series of distribution maps to indicate the range of a number of recent species which have a more or less characteristic pattern but which do *not* occur in Kansas or in portions of the "mid-continent" region. Although the general information contained in his maps is useful and the maps will prove of value to those needing such data, an examination of the records available in the Museum of Zoology indicates that the distributional data are in need of revision. The following records are submitted to show some of the discrepancies observed: (1) *Cionella lubrica* (Leonard's figure 7) is shown as not occurring in Kansas, Nebraska and South Dakota. There are, however, records from Roberts County, South Dakota; and Manhattan, Riley Co., Kansas. (2) *Discus cronkhitei* (Leonard's figure 8) is not supposed to occur in Kansas, Nebraska, South Dakota and most of Iowa. Its occurrence is established in Des Moines, Polk County, Iowa; Ruthven, Palo Alto County, Iowa; Roberts County, South Dakota; and Spearfish, Lawrence County, South Dakota. (3) *Striatura milium* is recorded from Devil's Lake, North Dakota, and Walker, in his *Mollusca of Alabama*, has many records of it for that state, although it is not shown to have a southern range on Leonard's map. (4) *Succinea ovalis* (Leonard's figure 14) is not supposed to occur in Kansas, but we have a record for it at St. Joseph, Cloud County, Kansas (on the Kansas drainage in the north central part of the state).

The above records concern land snails. Among the freshwater forms there are also collections available which show that the ranges given by Leonard (1950) are not as accurate as they could be. The following data are presented to supplement the information already given by him in previous publications. (1) *Valvata tricarinata* Say does extend into the midcontinent region and the Museum of Zoology has records which establish it in Manitoba, three counties in Iowa, and four counties in South Dakota. (2) *Valvata lewisi* Currier was discovered in the Yarmouthian fauna of "Lincoln County, Kansas (loc. 23)" and Leonard (1950: 11) stated: ". . . The Lincoln County, Kansas, record is far out of the range of the living species." There is, however, a recent record of its occurrence in Douglas County, South Dakota. (3) *Ferrissia parallela* (Haldeman) is recorded from Madge Lake, Saskatchewan, as well as from Roberts and Marshall counties, South Dakota. Such records reveal that the statement (1952: 21): "It is absent from the midcontinent region" will need to be revised. (4) *Aplexa hypnorum* (Linné)was not known according to Leonard (1950: 22) to occur in the midcontinent region. There are, nevertheless, records from Franklin, Palo Alto and Polk counties in Iowa; Cherry County, Nebraska; Roberts County, South Dakota; Devil's Lake, North Dakota; Ravalli and Gallatin counties, Montana; and Little Quill Lake, Saskatchewan.

Although the amount of information presented by Leonard regarding the distribution of recent forms is commendable, it is necessary to incorporate available information if we are to indicate whether or not certain species are among the recent forms inhabiting the midcontinent region. Since human occupation has altered considerably large areas in the high plains region it goes without saying that early collections must often be relied upon to attain an understanding of the original range of some of the recent species. Many records established by the late B. Shimek will probably never again be duplicated in a region so heavily farmed as Iowa.

In summary, the Jinglebob fauna in Meade County, Kansas, was found to contain a rich and varied mollusk fauna consisting of forty-nine species. An interpretation of the ecological needs for this assemblage indicates that the region was probably

warmer and had a greater rainfall than at present. Some of the aquatic snails are characteristically those which inhabit woods pools similar to those found in southern Michigan today. The fauna is typically Mississippian and there appear to be no endemic species. Although many distributional records are available in centers housing mollusk collections, more detailed maps giving the range limits of recent species are needed for critical analyses of the relation of Pleistocene faunas to recent species. The job of collating those distribution records is difficult because of the way such records are scattered among collections. Also, there are large areas still in need of painstaking field work.

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A STUDY OF LAMARCK'S TYPES OF UNIONIDAE AND MUTELIDAE

By RICHARD I. JOHNSON

(*Continued from October, 1952, issue*)

georgina, Unio: 1819, An. sans Vert. **6**, p. 74, No. 17 (Habite le lac George, Cabinet de M. Valenciennes). Holotype in the Paris Museum. Length 59 mm. Is *Elliptio complanatus.* Solander.

glabrata, Unio: 1819, An. sans Vert. **6**, p. 75, No. 21 (Habite la rivière de l'Ohio, Michaud). Holotype in the Paris Museum. Length 70 mm. Is *Elliptio complanatus* Solander.

glauca 'Valenciennes' Lamarck, *Anodonta:* 1819, An. sans Vert. **6**, p. 87, No. 13 (Habite en Amérique, dans des eaux douces voisines d'Acapulco, collection de MM. le baron Humboldt et Bonpland), 1841, Delessert, Rec. Coq. pl. 13, fig. 3. Figured holotype in the Geneva Museum. Length 98 mm. There is a specimen in the Paris Museum from Humboldt presumably from the type lot and figured by Fischer & Crosse, 1894, Mission Scientifique au Mexique et dans l'Amérique Centrale. Part 7, **2**, p. 533, pl. 69, fig. 1, 1a. Is *Anodontites glaucus* 'Val.' Lamarck.

intermedia, Anodonta: 1819, An. sans Vert. **6**, p. 86, No. 10 (Habite en France dans la Loire, etc. Cabinet de M. Dufresne), 4 cotypes in the Geneva Museum. Is *Anodonta cygnea* Linn.

ligamentina, Unio: 1819, An. sans Vert. **6**, p. 72 (Habite la rivière de l'Ohio, A. Michaud). Lamarck gives the measurement 77 mm. in length. The type in the Paris Museum is 73 mm. in length. Is *Actinonaias carinata* Barnes, see Ortmann and Walker, 1922, Occ. Papers, Mus. Zoöl. Univ. of Michigan No. 112, p. 47.

littoralis, Unio: 1801, Système des Animaux sans Vertèbres, p. 114; 1819. An. sans Vert. **6**, p. 76, No. 25 (Habite dans les rivières de France, commune dans la Seine). Six cotypes in the Geneva Museum. Is *Unio littoralis* Lamarck.

luteola, Unio: 1810, An. sans Vert. **6**, p. 79, No. 40 (Habite la rivière Susquehana et celle Mohancks, dans les États-Unis). Holotype in the Paris Museum. Length 69 mm. The description would indicate that Lamarck was describing *Lampsilis cariosa* Say. The type, however, is *Lampsilis siliquoidea?* Barnes.

manca, Unio: 1819, An. sans Vert. **6**, p. 80, No. 43 (Habite en Bourgogne, dans la Drée. Cabinet de M. de Ferussac). Could not be located, even though the Férussac collections were eventually deposited in the Paris Museum. Is *Unio pictorum* Linn.

marginalis, Unio: 1819, An. sans Vert. **6**, p. 79, No. 41 (Habite au Bengale, dans les rivières). Lamarck refers to Ency Method. 1797, pl. 247, fig. 1, a, b, c. Holotype in the Geneva Museum. Length 75 mm. Is *Lamellidens marginalis* Lamarck.

nana, Unio: 1819, An. sans Vert. **6**, p. 76, No. 27 (Habite dans la Franche-Comté, Cabinet de M. de Ferussac). Could not be located, even though the Férussac collections were eventually deposited in the Paris Museum. Is *Unio crassus batavus* Maton and Rackett.

naviformis, Unio: 1819, An. sans Vert. **6**, p. 75, No. 20 (Habite la rivière de Ohio, Michaud fils). Holotype in the Paris Museum. Length 75 mm. Is *Quadrula cylindrica* Say.

obliqua, Unio: 1819, An. sans Vert. **6**, p. 72, No. 8 (Habite la rivière de l'Ohio, A. Michaud). Could not be located but should be in the Paris Museum. Is *Pleurobema cordatum* Rafinesque.

patagonica, Unio: 1819, An. sans Vert. 6, p. 88, No. 15 (Habite dans l'Amérique, les rivières de la Plata et celles du pays des Patagons). Lamarck refers to Ency. Method. 1797, pl. 203, fig. 1, a, b. There are two cotypes in the Geneva Museum, one measuring 80 mm. in length and the other 60 mm. in length. Lamarck gives the length as from 72 to 80 mm. Is *Anodontites patagonicus* Lamarck.

pensylvanica, Anodonta: 1819, An. sans Vert. 6, p. 86, No. 9 (Habite la rivière de Schugikill, près de Philadelphie, M. Wanuxem), 1841, Delessert, Rec. Coq. pl. 13, fig. 4. Lamarck gives the measurement 51 mm. in length. The type figured by Delessert in the Geneva Museum is 47 mm. in length. Is *Strophitus undulatus* Say.

peruviana, Unio: 1819, An. sans Vert. 6, p. 71, No. 4 (Habite au Pérou, dans les rivières, Dombey). Lamarck refers to Ency. Method. 1797, pl. 248, fig. 7. Holotype in the Geneva Museum. Length 109 mm. Is *Amblema peruviana* Lamarck.

purpuraccns, Unio: 1819, An. sans Vert. 6, p. 73, No. 12 (Habite les rivières de l'état de New-Yorck, Cabinet de M. Valenciennes). The type of this species could not be located, though there are specimens of the varieties in the Paris Museum. Some are *Elliptio complanatus* Solander, the others *Lampsilis radiata* Gmelin.

purpurata, Unio: 1819, An. sans Vert. 6, p. 71, No. 6 (Habite . . . Je la crois des grandes rivières de l'Afrique). Holotype in the Geneva Museum. Length 139 mm. Is *Lampsilis purpurata* Lamarck.

rariplicata, Unio: 1819, An. sans Vert. 6, p. 71, No. 5 (Habite la rivière de l'Ohio, Michaud). Lamarck gives the measurement 62 mm. in length. The type in the Paris Museum measures 70 mm. Is *Amblema plicata* Say.

rarisulcata, Unio: 1819, An. sans Vert. 6, p. 72, No. 10 (Habite dans le lac Champlain, Cabinet de M. Dufresne). Could not be located. Might be in the Edinburgh Museum (see Sherborn, 1940, Where is the—Collection?, p. 47). Is *Elliptio complanatus* Solander.

recta, Unio: 1819, An. sans Vert. 6, p. 74, No. 19 (Habite le lac Erié, Michaud fils). Holotype in the Paris Museum. Length

100 mm. The original label says, "de la [vici] ite de Niaga [sic]. Is *Lampsilis recta* Lamarck.

retusa, Unio: 1819, An. sans Vert. 6, p. 72, No. 9 (Habite les rivières de la Nouvelle Ecosse, A. Michaud). Lamarck gives the measurement 47 mm. in length. The type in the Paris Museum measures 40 mm. Is *Obovaria retusa* Lamarck.

rhombula, Unio: 1819, An. sans Vert. 6, p. 74, No. 15 (Habite au Sénégal, dans les rivières). 1841, Delessert, Rec. Coq. pl. 12, fig. 8. Figured holotype in the Geneva Museum. Length 65 mm. Is *Elliptio complanatus* Solander.

rostrata, Unio: 1819, An. sans Vert. 6, p. 77, No. 31 (Habite dans le Rhône et les grandes rivières de l'Allemagne, de Silése, etc.). There are two specimens of this species in the Geneva Museum with the label, "Type prob." They each measure 88 mm. in length. Lamarck gives the measurement 99 mm. in length. Is *Unio pictorum rostratus* Lamarck.

rotundata, Unio: 1819, An. sans Vert. 6, p. 75, No. 24 (Habite . . . Cabinet de M. Daudebard et celui de M. Faujas). The type of this species could not be located. Is *Glebula rotundata* Lamarck.

rubens, Anodonta: 1819, An. sans Vert. 6, p. 85, No. 6 (Habite au Sénégal). The type of this species could not be located. It should be in the Geneva Museum. Is *Spatha rubens* Lamarck.

semi-rugata, Unio: 1819, An. sans Vert. 6, p. 76, No. 26 (Habite . . .), 1841, Delessert, Rec. Coq. pl. 12, fig. 6. Figured holotype in the Geneva Museum. Length 40 mm. Is *Unio semirugata* Lamarck.

sinuata, Unio: 1819, An. sans Vert. 6, p. 70, No. 1 (Habite dans le Rhin, la Loire, et les autres grandes rivières du continent européen, tempéré et austral). Four cotypes in the Geneva Museum. Lamarck gives the measurements 140 to 145 mm. in length. Is *Unio crassus* Retzius.

sinuosa, Anodonta: 1819, An. sans Vert. 6, p. 87, No. 14 (Habite . . . Cabinet de M. Daudebard). Lamarck refers to Ency. Method, 1797, pl. 203, fig. 2, a, b. Holotype in the Geneva Museum. Length 85 mm. There is a smaller paratype. Also one idiotype in the Paris Museum named by Lamarck and

coming from the Férussac collection. It has the same length as the holotype. Is *Anodontites sinuosus* Lamarck.

spuria, Unio: 1819, An. sans Vert. 6, p. 80, No. 45 (Habite . . . les régions australes de l'Asie?, Du voyage de Baudin). The type could not be found. It should be in the Paris Museum. Identification uncertain.

suborbiculata, Unio: 1819, An. sans Vert. 6, p. 81, No. 48 (Habite . . . les eaux douces des climats chauds?, Cabinet de MM. Daudebard et Faujas). The type consists of one valve measuring 92 mm. in length with the label "individual décrit par Lamarck et prouvenant du Cabinet de Faujas." Lamarck gives the measurement 80 mm. in length. Is *Glebula rotundata* Lamarck.

sulcata, Anodonta: 1819, An. sans Vert. 6, p. 85, No. 3 (Habite le lac Ladoga et les rivières des États-Unis). Lamarck refers to Ency. Method. 1797, pl. 202, fig. 1, a, b. Holotype in the Geneva Museum. Length 181 mm. There is also a smaller paratype which measures 135 mm. in length. Is *Anodonta cygnea* Linn.

sulcidens, Unio: 1819, An. sans Vert. 6, p. 77, No. 30 (Habite dans une rivière du Connecticut, M. Lesueur; et dans la rivière Schunglkill, M. Wanuxem), 1841, Delessert, Rec. Coq. pl. 12, fig. 3. Figured paratype in the Geneva Museum. Length 56 mm. Delessert figured the largest of three paratypes. The other two measure 48 mm. in length. The holotype from the Connecticut River is in the Paris Museum and measures 80 mm. in length. Is *Elliptio complanatus* Solander.

trapesialis, Anodonta: 1819, An. sans Vert. 6, p. 87, No. 11 (Habite . . . dans les eaux douces étrangères à celles de l'Europe?). Lamarck refers to Ency. Method. 1797, pl. 205, fig. 1, a, b. Holotype in the Geneva Museum. Length 140 mm. There is also a smaller paratype. Is *Anodontites trapesiales* Lamarck.

uniopsis, Anodonta: 1819, An. sans Vert. 6, p. 86, No. 8 (Habite . . . les régions australes?, Du voyage de Baudin). The type consists of one specimen measuring 74 mm. in length with the label, "individual décrit par Lamarck." It measures 57 mm. in length. Is *Microcondylaea compressa* Menke, see Haas,

1940 Zool. Series, Field Mus. Chicago, Illinois 24, No. 11, p. 133.

varicosa, Unio: 1819, An. sans Vert. 6, p. 78, No. 36 (Habite la rivière de Schuglkill, près de Philadelphie, M. Wanuxem;— aussi dans le lac Champlain. Cabinet de M. Valenciennes). Type in the Geneva Museum from the former locality and measuring 30 mm. in length. Lamarck gives no measurements. 1 specimen in the Paris Museum under this name, but is not *varicosa* Lamarck, but *Alasmidonta undulata* Say. Is *Alasmidonta varicosa* Lamarck.

virginiana, Unio: 1819, An. sans Vert. 6, p. 79, No. 39 (Habite la rivière Potowmac, en Virginie), 1841, Delessert, Rec. Coq. pl. 12, fig. 4. Figured holotype in the Geneva Museum. Length 60 mm. In the Paris Museum is a plaque with four specimens and the label, "*Anodonta virginia* Lam. de Virginie, fig. dans le Rec. Coq. pl. 12, fig. 4"; however these specimens are *Strophitus rugosus* Swainson and could not be Lamarck's types. Is *Elliptio complanatus* Solander.

THE POSITION OF "XESTA" CINCTA (LEA)

By HARALD A. REHDER

Xesta cincta (Lea) has long been the name of a species with several geographic races inhabiting the northern peninsula of Celebes. Lea (1834, Trans. Amer. Phil. Soc., n. s., **5**: 56; Observ. Genus Unio, **1**: 168, pl. 19, fig. 68) described under the name *Helix cincta* a specimen which he doubtfully attributed to Java. Henry Adams (1865, Proc. Zool. Soc. London: 406) and von Martens (1867, Preuss. Exped. Ost-Asien. Zool. Theil, **2**: 212–213) were the first to assign this name to the species from northern Celebes, basing their determinations on specimens labeled *cincta* Lea in the Cumingian collection, although von Martens noticed that Lea's figure did not quite agree with these specimens. Subsequent students have followed these workers. The cousins Sarasin, for instance, (1899, P. and F. Sarasin, Die Landmollusken von Celebes: 151–158, pl. 19) gave a detailed account of the variations found in the complex they called the "Formenkette" (chain of forms) of *Xesta cincta* (Lea). They

recognized three forms, the typical one from the eastern Minahassa section of the peninsula, the form *mongondica* P. and F. Sarasin from the central part of the peninsula, and the form *limbifera* (v. Martens) found in the western part. More recently Rensch (1933, Mitt. Zool. Mus. Berlin, **19**: 113–114) has termed these forms geographic races, and considers the complex to form a typical Rassenkreis. Niethammer, in his contribution to the knowledge of the land mollusks of Celebes (1937, Archiv f. Naturgesch. n. F., 6: 399) agrees with the Sarasins and Rensch.

An examination, however, of Lea's type of *Helix cincta* (U.S.N.M. 105320) reveals the fact that it is not the Celebes species at all, but a form of *Eurycampta arctistria* (Pfeiffer) (Helminthoglyptidae: Cepolinae) from central and western Cuba. It is noticeably different from the East Indian species in possessing a heavier shell, with coarser, more malleate sculpture, with the columellar portion of the lip more reflexed, and without the dark spot in the umbilical region. Von Martens (l.c.: 213) is in error when he says that Lea's description mentions this umbilical spot though his figure does not show it. On the contrary, Lea states that the color is "more pale" about the umbilicus.

The species from northern Celebes must, therefore, take the next available name, which is *Naninia steursi* (Shuttleworth, 1852), not only because Lea's name relates to a Cuban snail, but also because the name *Helix cincta* had been used twice previously, by Müller in 1774, and by Sheppard in 1823.

I might point out that the generic name *Xesta* Albers, 1850, which is usually applied to the Celebes species, should be replaced by the earlier name *Naninia* Sowerby, 1842, as pointed out by H. B. Baker (1936, Nautilus **50** (1): 30; 1938, **51** (3): 104–105), both genera having the same type species.

The Cuban species *Eurycampta arctistria* (Pfr.) appears to break up into several races. When this ccomplex is completely studied Lea's *Helix cincta* will fall into the synonymy of the name applied to one of those geographic subspecies. In the collections of the United States National Museum are specimens from the shores of Bahia de Cochinos, Las Villas Province, that match Lea's specimen.

SOME SPHAERIIDAE OF UTAH

By H. B. HERRINGTON and E. J. ROSCOE

The specimens recorded in this paper were collected by the junior author in the Uinta Mountains (Summit County) and Wasatch Mountains (Salt Lake County) in the northeastern part of Utah, U. S. A., from 1944 to 1949. The determinations were made by the senior author. There were nineteen collections made from sixteen stations representing four different habitats—ten lakes, four ponds, one river and one brook. All except two stations (lakes) were in the Uinta Mountains. The stations ranged in elevation from about 9000 to 10,500 feet in the Uinta Mountains and from 9030 to 9369 feet in the Wasatch range.

Seven species are represented, all belonging to the genus *Pisidium*. Six species were taken from the waters of the Uinta Mountains and three from those of the Wasatch Mountains. The names of species are revised in the light of present knowledge. There were 352 complete specimens and 87 single valves. *Pisidium casertanum* (Poli) (87%) were taken in all nineteen collections; *P. ferrugineum* Prime form *medianum* Sterki were found in six lakes and two ponds; *P. variabile* Prime in three lakes; *P. lilljeborgi* Clessin and *P. subtruncatum* Malm each in two lakes; and *P. obtusale* C. Pfeiffer and *P. nitidum* Jenyns each in one lake only.

Distribution by Bodies of Water

	Lakes		Ponds		River		Brook	
Species	No. lots	No. spms.	No. lots	No. spms.	No. lots	No. spms.	No. lots	No. spms
P. casertanum	13	183 20/2	4	78 10/2	1	3	1	3 3/2
P. ferrugineum f. *medianum*	6	34 1/2	2	3				
P. variabile	3	21 27/2						
P. lilljeborgi	2	11 1/2						
P. subtruncatum	2	1 1/2						
P. obtusale	1	1						
P. nitidum	1	14 24/2						
Grand total	28	265 74/2	6	81 10/2	1	3	1	3 3/2

Single valves are represented as fractions.

The senior author has also a few lots from other parts of Utah:

P. milium Held, Parawan reservoir, Parawan Mountains, Iron County.

P. compressum Prime. Utah Lake, Utah County; center of south end of Bear Lake, Cache County; Tooele County, Pleistocene sediments of Lake Bonneville.

Sphaerium (*Musculium*) *lacustre* (Müller) form *ryckholti* (Normand), Slough at south end of Fish Lake, Sevier County.

A COLOMBIAN POMACEA OF THE EFFUSA GROUP

By HENRY A. PILSBRY and AXEL A. OLSSON

On the automobile road from Cartagena to Barranquilla there is a fresh water lake known as the Cienaga de Luruaco. Stopping there one day in March, 1952, the junior author found numbers of a *Pomacea* of the subgenus *Effusa*, remarkable for their very small size for this genus, suggesting the specific name.

Pomacea (Effusa) oligista, new species. Plate 6, fig. 6.

The shell is quite thin, openly umbilicate, subplanorboid, of about 4½ whorls, the surface rather dull, olive buff, sometimes uniform but usually with spiral bands of sepia or nearly black, varying in number from two or three to six (as in the type specimen, the left hand figure, the upper and lower bands faint). The spire is very short, conic. The whorls weakly convex at first but very strongly convex above in the last two whorls, which are parted by a very deep suture. The base is narrowly rounded. Aperture oval, somewhat oblique, the basal margin being advanced beyond the upper. Parietal callus thin.

Height 13.1 mm., diameter 19 mm., length of aperture 11.5 mm. Type.

Height 14 mm., diameter 20 mm., length of aperture 12.5 mm. Largest paratype.

A careful study of the *Effusa* group was made by Dr. H. B. Baker in Occasional Papers Mus. Zool. Univ. Michigan, no. 210,

pp. 10–26. The smallest form mentioned by him, *P. glauca minuscula* H.B.B., is larger than our species, and less depressed, solid, the suture not so deep, and differently sculptured. Equally small young of other races of the *P. glauca* group compared are less depressed and far more solid than *P. oligista.* The thin shell and dull texture of the new form are perhaps its most prominent characteristics.

The spire is more conic and the base much less broadly open than in *P.* (*Marisa*) *cornuarietis* (L.), and the shell is much thinner.

VENTRIDENS IN STATEN ISLAND, NEW YORK

By MORRIS K. JACOBSON

Ventridens suppressus (Say) has been reported from Staten Island by Hubbard & Smith (1865) as *Helix suppressus,* by Sanderson Smith (1887) as *Zonites suppressus,* and by Pilsbry (1946). The first two reported it as occurring "not abundantly" and "rarely" respectively. Pilsbry alone gave a more definite locality, naming Richmond, Staten Island as the site. In a personal communication, Dr. Pilsbry states that the source of his reference is unknown. It probably is based upon either a personal note to the Academy of Natural Sciences or upon a lot of shells I have been unable to uncover. The American Museum of Natural History has a lot of 45 specimens (№60844) from the old Crooke Collection, a lot that has recently been checked by Clench. However this lot bears only "Staten Island" as the locality. Dr. Pilsbry informs me that the Academy has no specimens of this shell from Staten Island. In recent years we have looked for this shell near Richmond Town and elsewhere, but have found no trace of it on Staten Island.

Ventridens ligera (Say) is reported from Staten Island only by Pilsbry (1946), a reference probably based upon a lot of 7 specimens in the American Museum (№61377), locality "Staten Island," collector unknown. This lot too was recently checked by Clench. These shells are the typical *ligera,* a rather large, heavy shell, very small umbilicus and a thick, yellow callus in the umbilical region. This species is not reported by S. Smith

or Hubbard & Smith; neither is it reported from neighboring Long Island by H. Prime (1894) nor Smith & Prime (1870). The Bulletin of the Brooklyn Conchological Club (1907) also fails to report it from the New York area. Aside from the Pilsbry report noted above, the reference closest to Staten Island for this snail is contained in the Gratacap Catalogue (1901). Here, as *Zonites* (*Gastrodonta*) *ligerus,* it appears in a lot of one specimen from Red Bank, New Jersey, about 15 miles from the southwest tip of Staten Island. I was unable to locate this specimen in the American Museum collection.

On May 10, 1952 the New York Shell Club, on its fourth annual outing, found a huge colony of this snail in New Springville, not far from Richmond Town. The locality is an old plowed field, now lying fallow, on Travis Avenue about one mile south of Victory Boulevard, opposite the Olson farm. The snails were found at the base of high grasses, crawling on moist ground near the old plow furrows. They were found isolated or in "nests" containing six to a dozen specimens. The shell is very thin, the callus not at all prominent and the perforation slightly larger in proportion. Hence they seem to approach the form *stonei* Pilsbry (op. cit., p. 468). On this field, Ventridens preferred the moister situations, the drier ones being occupied by *Succinea ovalis* (Say), its most prominent associate. In addition we found small numbers of the typically dwarfed New York City forms of *Mesodon thyroidus* (Say). In the small woods bordering the field, we collected *Carychium exiguum* (Say), *Zonitoides arboreus* (Say) and *Discus cronkhitei catskillensis* (Pilsbry).

It is surprising that so large a colony has not been reported previously, but a fact we discovered serves to date the appearance of this group here and explains its absence from the earlier lists. In the Staten Island Museum there is a collection of land and fresh water shells made by the late William T. Davis, the world famous authority on cicadas and dean of Staten Island naturalists. Among these shells, each lot provided with a complete label written in precise, neat script, there appear three lots collected in New Springville: *Succinea ovalis* collected July 19, 1891, *Succinea ovalis* collected March 12, 1921, and *Mesodon thyroidus* collected April 23, 1933. Apparently New Springville

was a favorite collecting spot of Davis's and the lots collected show that he did not fail to notice the larger and medium sized land mollusks from this area. Hence I believe we are safe in assuming that this colony of *V. ligera stonei* must have appeared on Travis Avenue at some time subsequent to April 1933. Though there are no data to support me, we can guess that it was introduced on seed or crops from the area of the drainage of Delaware Bay.

Pilsbry puts his form *stonei* 1889 in the synonymy of *ligera* and in a personal communication (May 15, 1952) states: "The form with very thin or wanting internal callus is occasionally met in places deficient in lime." However the lot in the American Museum noted above indicates that the heavy-callused typical *ligera* as well as the thin-callused form *stonei* has occurred in Staten Island, where very little limestone occurs on the surface. Thus the strong possibility exists that in *stonei* we are faced with a valid subspecies, or perhaps even a species. At all events I cannot agree that *stonei* is simple synonym of *ligera.*

Besides to Dr. Pilsbry, who is always ready to give generously of his time and invaluable advice, my warmest thanks are due to Mr. Fred Weir, who helped me in my search in the rich American Museum collection, and to Miss Mathilde Weingartner of the Staten Island Museum, who kindly permitted me to examine the valuable Davis collection.

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DISPOSING OF DUPLICATE SHELLS

By MERRILL MOORE, M.D.

Everyone who collects sea shells finds himself with duplicates on hand. What to do with them is never a serious problem but it does present certain alternatives worth considering as expressed in the question, "What is the *best* thing to do with them?" The disposal of duplicate shells from any collection can also be tied in with the fact that each year there is an oncoming wave of population, some five or six million, depending on the annual birth rate, made up entirely of young individuals who have never seen a shell or who, if they have, may know relatively little about them, because unfortunately malacology is not one of the subjects to which much attention is devoted in the grade schools and the high schools of our nation and there is where most formal education stops for the majority of the people.

With these two thoughts in mind, I have found a present solution that gives me some pleasure and satisfaction in its pursuit, enabling me in one gesture to dispose of my duplicates, and at the same time initiate others into the mysteries of malacology, starting with the collection of sea shells which is its natural point of origin.

For example, once I collected all kinds of shells but soon my shelves got so crowded I decided to specialize in cones, so now (except for a few beautiful specimens) all I keep are species of genus *Conus*.

Every time I go to Sanibel I bring home several bushels of all sorts of shells in the back of my car, and the trips I have made to the Caribbean and to the Pacific have inevitably ended with a large supply of excess shells. Just giving these away individually or by the handful seems unorganized and relatively ineffectual. Accordingly some years ago I hit on the following plan: I save old boxes and paper bags of suitable size and fill them with an assortment of common shells (all duplicates, of

course) and into them I put a leaflet I have had printed which gives a little information about them and a few suggestions which the interested beginner may choose to follow up. These I distribute whenever and wherever I find anyone who might be interested. For example, invalids, shut-ins, children in hospitals, bored people and persons who have limited resources and few interests are all suitable candidates for this little present which may be considered the nucleus of a collection (if they wish to extend it), with a small chart or blueprint outlining an approach the receptive individual may take and follow if he chooses to do so. Any old wide-mouthed bottle or jar or cellophane bag or cardboard container will do to hold the shells. I put in anywhere from twenty to fifty, usually one or two of each species and maybe a dozen genera, enclose the printed leaflet and let it go at that. I am often delighted to find that this suggestion and encouragement was just enough to make a beginning and start another individual towards that fascinating sub-department of general biology (and adult education, if you please), commonly known as "Conchology," but more properly called "Malacology."

I suppose the difference between the conchologist so-called and the malacologist is one of degrees, but it seems to me suitable that every child in the United States might properly be exposed to the virus of shell collecting sometime during his stay at the first eight grades or his shorter sojourn in the four years of high school or preparatory school. The amazing thing to me, and this I can state as a scientific fact, is that in twenty-five years of collecting and distributing shells among my friends and acquaintances, *I have never once encountered a child that did not "take to them naturally" and like them.* Thus, children universally repeat in the life of the present individual the ancient history of our race as we know it from evidence encountered in the prehistoric kitchen-middens and the tomb treasures found everywhere on the face of the earth, from Chinese cave relics to the shell treasures unearthed in the burial sites of the mysterious Mound-Builders of the Mississippi, Tennessee, and Ohio River valleys.

I enclose a printed leaflet on studying shells with each parcel of shells. It begins—

Here are a few shells. I suggest that you take each one in your hand and look it over. Some shells are naturally small and do not grow much larger than these; others are the young of larger species and might have developed into larger shells. There are five easy things you can do with shells: 1. Look at them. 2. Draw them. 3. Study and try to classify them. 4. Read about them. 5. Some people like to make things out of shells.

Then it goes on to give the means of some elementary books, such as Baily's edition of Keep's *West American Shells,* Aldrich & Snyder's *Florida Sea Shells* and others. Then about the classes of shells, Cephalopods, Gastropods, Chitons, Scaphopods and Pelecypods. I shall be glad to send copies of this leaflet to anyone interested. It can be modified to suit different localities.

NOTES AND NEWS

His first ninety years.—Dr. Pilsbry, who has been senior editor of The Nautilus since its beginning, 64 years ago, arrived at his 90th birthday on a Sunday, Dec. 7, 1952. The following day the Academy of Natural Sciences of Philadelphia gave a tea in his honor, and presented him with a life membership. Everybody hoped that he would enjoy it for the next nine decades. Dr. Pilsbry spent Christmas with his daughters in Lantana, Florida, and will return to Philadelphia with the spring.—H. B. B.

Federal regulations on importing living mollusks.—Free copies of these regulations may be obtained by writing to the Division of Information, Bureau of Entomology and Plant Quarantine, Department of Agriculture, Washington 25, D. C. The regulations prohibit the importation of living land and fresh-water mollusks into the United States, except by special permit which may be obtained by writing to the Chief of the Bureau of Entomology and Plant Quarantine, Department of Agriculture. The regulations do not apply to cleaned, dead or preserved shells nor to seashells or other marine mollusks.—R. Tucker Abbott.

The Branham Shell Museum, Fort Myers Beach, Florida, opened to the public November 15th, the hours being 1 to 5 daily except Monday. All who are interested in shells, either

for scientific study or as decorative objects, are cordially invited to visit the Museum.—Mrs. Hugh Branham.

The New York Shell Club Notes, No. 7, March 1952, contains the narrative of a trip by Jack H. McLellan to the original and only known locality of *Triodopsis platysayoides* (Brooks), in Coopers Rock State Forest, Monongalia Co., West Virginia. A full account of this rugged spot is given.

Egypt. Dr. Henry van der Schalie of the University of Michigan Museum of Zoölogy is on a visit to Egypt, for the study of fresh water mollusks.

L. A. Burry. Notice of the death of this well known collector of Pompano, Florida, has been received. His friends and correspondents will miss him sorely.

PUBLICATIONS RECEIVED

Primitive fossil gastropods and their bearing on gastropod classification. By J. Brookes Knight (Smithsonian Misc. Coll., vol. 117, no. 13, 56 pp., 10 text-figs. and 2 pls. 1952). A tribulation to the student of fossil mollusks is the fact that, unlike the skeleton of a vertebrate, the relatively simple shell or test of a snail gives so few clues to the animal's amazing complexities. For this reason, one can understand why many conservative paleontologists have been satisfied to assign most of their shells to some major group of living mollusks. Knight goes to the other extreme, and on the basis of six (or 8?) admittedly bilateral muscle-scars, proposes to revolutionize the division of the Mollusca into classes. Of course, even though the time from Cambrian to Recent may be only a fraction of the total span of living things (or even of mollusks), a zoölogist is willing to admit that a Cambrian snail possibly may have been bilaterally symmetric internally, although, on the sole basis of its muscle-scars, he might prefer the ungrammatic "Scotch verdict of not proven." One of the outstanding eccentricities of the gastropods is their repeated development, in widely diverse groups, of some degree of at least external symmetry, either with patelli-

form shells or, even more markedly, in naked slugs. On the other hand, one of the more constant characteristics of the phylum Mollusca, outside Lankester's grade (subphylum) Isopleura (Polyplacophora[1]), is the secretion of the principal exoskeleton,[2] mainly by the mantle periphery, around (or away from) one or two centers. For these reasons, to infer "that the eight-segmented shell of the polyplacophoran was merely the single shell of the monoplacophoran separated into eight segments . . . ," seems almost as inconsequent to this zoölogist as does, to many geologists, Scharff's erection and destruction of a mighty Atlantic mountain-chain, largely on the basis of a few recent clausiliids. Nevertheless, the data in this real contribution are presented excellently.—H. Burrington Baker.

Revision of the pelecypod genus Echinochama. By David Nicol (Jour. of Paleontology, Sept., 1952, pp. 803–817, 2 plates). Five species and three subspecies are recognized, all in American Miocene to Recent faunas. Two of them are from the Pacific coast: *Echinochama arcinella californica* Dall, Lower California to Panama, living, and *E. a. olssoni* Nicol, Burica Peninsula, R.P., Pliocene or Pleistocene. *E. cornuta* (Conrad) is the only species found living within the United States, South Carolina to Florida. It has usually been reported as *"Chama arcinella"* or as a variety of *arcinella* (as in Nautilus, *51:* 79); but the typical *E. arcinella* (L.) is Caribbean.

Nomenclatural review of genera and subgenera of Chamidae. By David Nicol. (Jour. Washington Acad. Sci. 42, pp. 154–156). A list with bibliographic references, type designations, and brief comments.

A new glycymerid from the Western Atlantic. By David Nicol (Jour. Washington Acad. Sci., *42:* 266, 267. 1952). *Glycymeris spectralis,* n. sp., is widely spread, from Cape Lookout, S.C. to Central America, the type from Lake Worth, Boynton, Fla. It is a small species, about 20 mm. long, with narrow, slightly raised radial ribs and radial striae.—H. A. P.

Molluscan fauna of the Kishenehn formation, Southeastern British Columbia. By Loris S. Russell (Ann. Rep. Nat. Mus.

[1] Chitons; the "Aplacophora" are not closely related and may not be mollusks.

[2] Shell, valves, or shell and operculum.

Canada for 1850–51, pp. 120–133, 4 plates, 10 text figs. 1952). The age of this Tertiary formation of the Flathead River Valley is thought from the evidence now available to be Middle Eocene, several species being comparable to Bridger mollusks. The species are all new, belonging to the genera *Elliptio, Lampsilis Sphaerium, Stagnicola, Planorbis, Gyraulus* and *Goniobasis.* The *"Planorbis" kishenehnensis* is a peculiar, large (32 mm.) form, somewhat like a depressed *Australorbis,* which does not seem referable to any recognized American genus.—H. A. P.

Description of a new pelecypod of the genus Lima from deep water off central California. By Leo George Hertlein (Proc. Calif. Acad. Sci., *27:* 377–381, pl. 20, figs. 12,13. 1952). *Lima* (*Acesta*) *mori* is a large species, height 61.8 mm., from off San Mateo Co. in 690–800 fms.

Shells from the bird guano of Southeast Farallon Island, California, with description of a new species of *Liotia.* By Allyn G. Smith (Proc. Cal. Acad. Nat. Sci., *27:* 383–387). Southeast Farallon is a bare and rugged rocky island about a mile long and half a mile wide, lying 27 miles west of the Golden Gate. It is noted for the vast numbers of sea birds nesting there. Good numbers of shells were found in the guano in some places, 30 species being listed, many of them species living at moderate depths ordinarily taken only by dredging. *Liotia farallonensis,* n. sp., a fine species of 12.9 mm. diameter, is described and figured.

A rare species of chiton from Pioneer Seamount off central California. By A. G. Smith and G. D. Hanna (Proc. Cal. Acad. Sci., *27:* 389–392). The peculiar and little known *Placiphorella* (*Placophoropsis*) *pacifica* Berry was brought up on rocks dredged from this seamount. It was previously known only from Alaska. It is fully described and for the first time figured. —H. A. P.

The scaphopod mollusks collected by the first Johnson-Smithsonian Expedition. By William K. Emerson (Smiths. Misc. Coll. 117, no. 6, 1952). Seventeen species are recorded, all from stations in the Puerto Rican Deep. *Dentalium* (*Episiphon*) *johnsoni,* n. sp., is described and figured.

Generic and subgeneric names in the molluscan class Scaphopoda. By W. K. Emerson (Jour. Washington Acad. Sci.,

42, No. 9, 1952). The names are listed and genotypes indicated. The subgenus *Antalis* is credited to Herrmannsen, though that author merely listed a pre-Linnean name, gave no definition whatever and mentioned no species.

NOMENCLATURAL NOTES ON THE SCAPHOPOD MOLLUSCA: the type species of *Fustiaria* and *Pseudantalis*. By William K. Emerson (Proc. Biol. Soc. Washington, *65:* 201–208). A critical and apparently exhaustive study of involved type designations. In conclusion: "*Pseudantalis* (genotype *Dentalium rubescens* Deshayes, 1825) is a junior subjective synonym of *Fustiaria* (genotype *Dentalium circinatum* Sowerby, 1823)."—H. A. P.

NOTICE TO SUBSCRIBERS

INFLATION is still with us. This year, the costs of printing THE NAUTILUS have been raised again. Even before the increase, the total intake from subscriptions did not equal these charges. As our readers are aware, THE NAUTILUS has no endowment, pays no salaries, and declares no dividends. We give our time gladly, but cannot afford monetary losses.

Beginning with volume 67 (July, 1953), the subscription rate will become $3.00 a year to domestic subscribers, including Canada, all American nations and the Phillipines, and $3.15 to other foreign subscribers. Single copies will be 75 cents. Renewals to subscriptions for 1953 will be at the old rate, but new subscriptions beginning with the January, 1953, number will be $2.75, and those beginning with the April number, $3.00.—H. A. P. and H. B. B.

Imogene Strickler Robertson (1872–1953)

THE NAUTILUS

Vol. 66 APRIL, 1953 No. 4

A NEW SPECIES OF PLEUROBRANCHUS FROM THE CARIBBEAN (TECTIBRANCHIATA) [1]

By N. T. MATTOX

Department of Zoology and Allan Hancock Foundation,
University of Southern California

During the period from March, 1950 through April, 1952 various invertebrates were collected on a small coral island off shore from Parguera, Puerto Rico. In four of these collections, an interesting tectibranch was encountered, in all, about 30 specimens. Upon study, this form proved to be an undescribed species of the genus *Pleurobranchus*.

As pointed out by Abbott (1949) a great deal of confusion exists in the classification of the subfamily Pleurobranchinae, especially those forms which have been associated with the genus *Pleurobranchus* Cuvier, 1805. In this regard the writer agrees with Thiele (1931) on the separation of the subgenera. The subgenus *Pleurobranchus* s.s. Cuvier, 1805, is made up of those forms with an anteriorly located shell, and with female orifice and penis not separated; the subgenus *Oscanius* (Leach) Gray, 1847, has forms with a posteriorly located shell, and with the female orifice separated from penis by fleshy lip or space. *Susania* Gray, 1857 stands as a synonym of *Oscanius*.

The subgenus *Pleurobranchopsis* Verrill, 1900 is comprised of those with a rudimentary or poorly developed shell. The species here described is considered a member of the subgenus *Oscanius*.

[1] Contribution from the Allan Hancock Foundation No. 109.

Pleurobranchus (*Oscanius*) *amarillius* **new species.**

Body.—The living animal is elongately rounded and dorsally convex, the holotype measuring 37.5 mm. in length and 25.5 mm. in width (fig. 1). The mantle is larger than the foot, in a slightly contracted, preserved specimen with the mantle 36 by 23 mm. The foot measures 24 by 15 mm. The anterior edge of the mantle has a very shallow, indistinct median sinus. The dorsum appears to be smooth, but is covered with microscopic (approximately 0.1 mm.) papillae which may be retracted into tiny dorsal perforations. The color of the living animal, young and adults, is a uniform bright yellowish orange. The entire body is very soft and semi-translucent, suggesting a mass of "orange gelatin"; it is more translucent toward the edge of the dorsum. Clusters of small, crystalline spicules are embedded throughout the dorsum. These spicules are variable in size from 0.3 mm. to 0.1 mm. in length by 0.07 to 0.01 mm. in width. As indicated in fig. 4, the form and arrangement of these spicules are variable.

Head.—The velum extends anteriorly beyond the foot, is rounded anteriorly and roughly trapezoid in outline. The lateral edges of the velum are grooved (fig. 2). The color of the veil and head is the same yellow-orange as that of the body. During locomotion, the veil may be extended completely beyond the anterior margin of the dorsum. The mouth is located at the median, ventral junction of the veil and body. The two rhinophores arise slightly dorsal to and anterior to the deeply set, black eyes. The rhinophores are elongated, cylindro-conic structures, each being a loosely rolled plate, the margins external, the lower overlapping the upper. In life, the rhinophores are very contractile.

Ctenidium.—The branchial plume lies on the right side in the space between the foot and the mantle; in life the gill may be completely covered by the mantle or extended posteriorly and laterally. The plume may be extended beyond the posterior edge of the mantle or contracted to less than one-half the body length. The posterior third of the plume is free from the body, being supported by a membrane. Arising from the primary rachis is an average of 20 pairs of secondary pinnules. Each pinnule

arises from a swollen area on the rachis. Each pinnule is plumose in form. Twenty-two is the maximum number of pinnules observed. At the base of the membrane supporting the posterior third of the ctenidium is located the anal opening. Directly anterior to the base of the plume and dorsal to the genital eminence is found the external opening of the excretory organ.

Shell.—The shell (fig. 3) is small, calcareous, auriculiform, and semi-quadrate in outline. It is approximately one-seventh the total length of the animal; in an alcohol specimen 33 mm. in length the shell was 5 mm. long by 2.9 mm. wide. It is thin, flat, only slightly convex in last whorl. The spire is short, but conspicuous, with about 2½ whorls. The color in life is white with a yellowish tint. The shell is embedded in the dorsum approximately one-fifth the length from the posterior edge. It lies slightly to the left of the mid-dorsal line.

Mandibles.—The mandibles are elongate, flat, squared posteriorly, and rounded on the more narrow anterior edge, the dimensions are approximately 2.6 mm. by 1.3 mm. Each mandible is composed of a closely set series of platelets. There are approximately 115 rows of these platelets with approximately 85 in each row in the wide part of the mandible. Each platelet is approximately 0.9 mm. in length by 0.19 mm. in width at the extended articulation points (fig. 7). Each platelet possesses a prominent, median denticle with from 1 to 3 lateral, smaller denticles on each side.

Radula.—The radula is located in an extensible proboscis, extendable to about one-fourth the body length. In an alcohol specimen 20 mm. in body length, the radular plate was 5 mm. in length by 7 mm. in greatest width. The outline of the flattened radular plate is pyramoidal, the teeth are very closely set anteriorly and more widely spread posteriorly. The radula is composed of from 180 to 190 rows of teeth with about 400 teeth in each row; the formula is 200–0–200. The teeth are long, slender, and slightly arcuate with an uncinate apex. Below the apical tooth there are from 2 to 10 smaller denticles. Figures 5, 6, 8, and 9 indicate the variations in this dentition. The teeth of the anterior rows average 0.25 mm. in length, the lateral teeth being slightly wider than the median teeth (figs. 8, 9). The

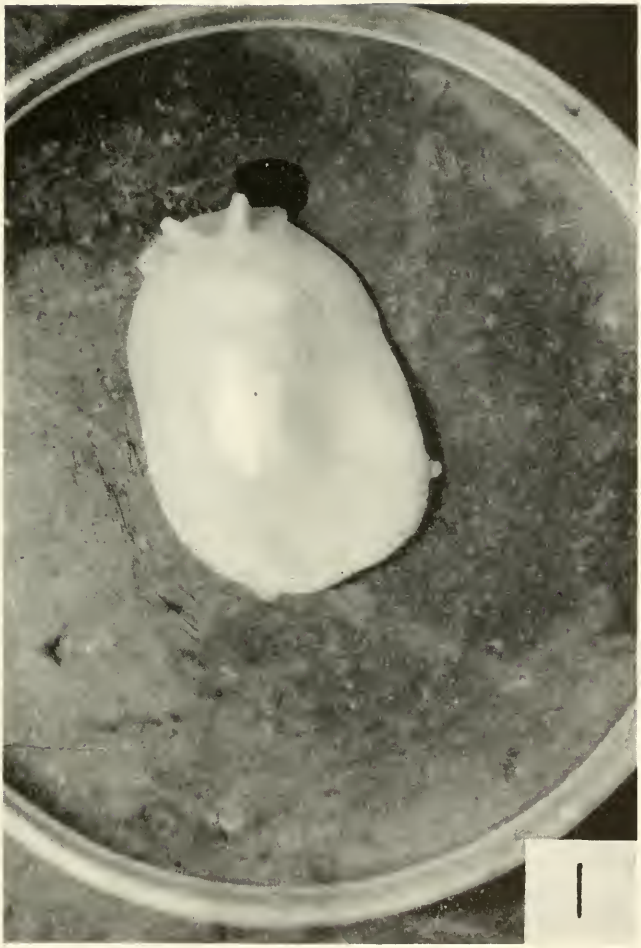
median posterior teeth average about 0.10 mm. in length, and the more elongate lateral teeth average 0.30 mm. in length.

Genitalia.—The external genitalia are located on a papilla, 5 mm. in width, on the right side of the body anterior and ventral to the ctenidium. The female openings are located in a depression posterior to the conical penis; the vagina is anterior to the oviduct-nidamental opening (fig. 10). The internal genital mass is very conspicuous. The hermaphroditic duct leads directly from the posteriorly located hermaphroditic gland over the surface of the large nidamental gland to a foliate, oblong, 2 mm. long prostate gland. From the prostate gland the vas deferens extends to the base of the penis with a few undulations. At approximately two-thirds the length of the vas deferens, a 3 mm. long diverticulum arises. This structure seems to be a seminal vesicle, "poche annexe du canal deferent" of Vayssière. From the point of connection with the prostate gland, the hermaphroditic duct proceeds ventrally as the oviduct to open in close junction with the nidamental aperture. The nidamental-albumen gland complex is a very large, lobate structure; in an alcohol specimen 40 mm. in length, this complex was 13.0 mm. in length. Anterior and slightly ventral to the oviducal opening is the vaginal opening. The vagina is approximately 0.25 mm. in length and opens dorsally into an ovate spermatotheca of about 0.17 mm. in length. From approximately the middle of the vagina, there arises a posteriorly extended tube which terminates in a spermatocyst, "poche copulatrice annexe" of Vayssière. The vaginal and oviduct-nidamental openings enter a common crescent-shaped depression on the posterior half of the genital papilla.

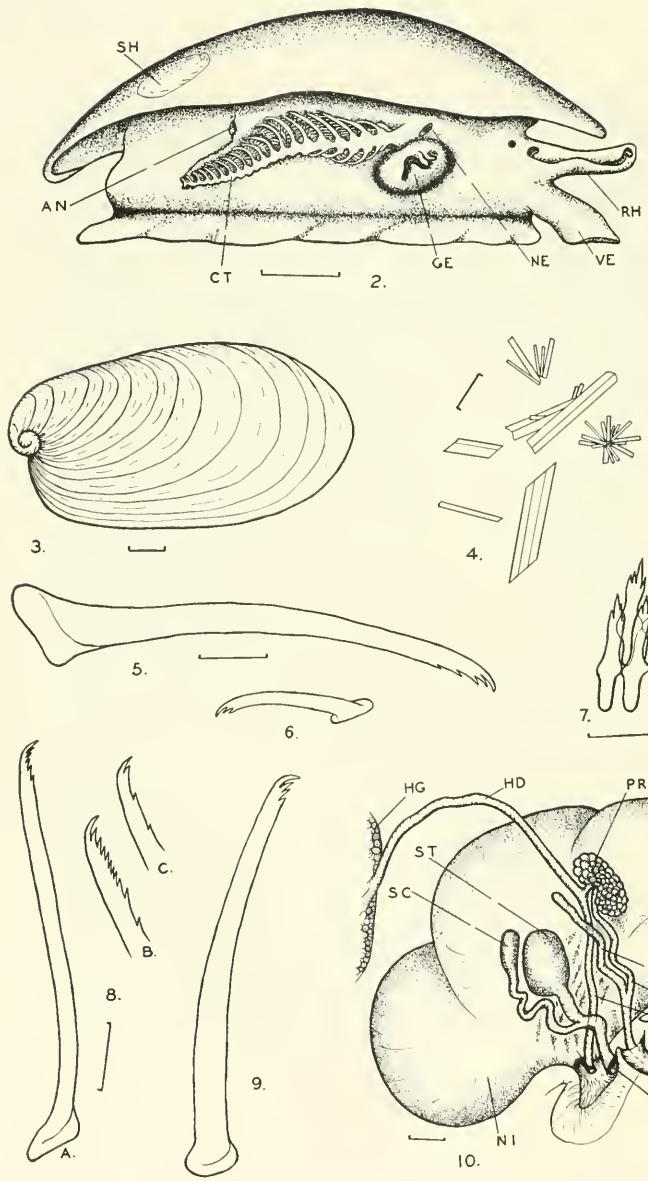
Type locality.—Isla de la Gata, Parguera, Puerto Rico, April 16, 1952.

Types.—Holotype U.S.N.M. No. 574844; 2 paratypes and shell U.S.N.M. No. 574845; 12 paratypes and paratype shell in the Allan Hancock Foundation collections.

Remarks.—This species has been found by the writer and collector, only in the type locality. This small, 1-acre, coral-formed island lies about 1 mile off shore. The *Pleurobranchus* was found under coral rocks and fragments of dead *Acropora* which lie on beds of the finger coral, *Porites porites*. As indi-



Pleurobranchus (*Oscanius*) *amarillius* Mattox



Pleurobranchus (*Oscanius*) *amarillius* Mattox. Explanation on page 113.

cated for *P. atlanticus,* by Abbott, these animals were normally found resting on the regions of the dead zooids. They have been found only in shallow, 1 to 3 feet deep, water on the coral flats around this island; they probably occur on other nearby islands but have not as yet been observed.

Pleurobranchus (*Oscanius*) *amarillius* seem to be most closely related to *Pleurobranchus quadridens* (Mörch) described from nearby St. Thomas, Virgin Islands. The excellent description of *P. quadridens* by Bergh (1897–98) leaves no doubt as to the validity of that species and also points out differences from the form here under consideration. Both *P. quadridens* and *amarillus* are orange as adults as are at least eight other members of the genus. The young of *quadridens* is recorded as being cinnamon in color, a color not observed for *amarillius.* The more numerous pinnae on the ctenidium, more elongate body, fewer teeth on the radula (only 150 rows with 70–0–70 formula), and the shorter shell of *quadridens* separate it from *amarillius.* The radular teeth of *quadridens* are elongated as in *amarillius* but have fewer sub-denticles and seem to be longer in proportion. The large nidamental gland complex seems to be unique for *amarillius,* Bergh gives 6.5 mm. as the diameter of this complex for *quadridens.* The presence of the seminal vesicle, the color of the body, long radular teeth, radular formula, form of the shell, smooth dorsum, and the straight-sided crystalline spicules will separate *P. amarillius* from the other American species of this group.

Explanation of Plates 9 and 10

Fig. 1. Photograph of dorsal view of living animal in Petri culture dish. (Plate 9; figs. 2–10 on pl. 10.)

Fig. 2. Lateral view of animal. An, anus; ct, ctenidium or gill; ge, genital papilla; ne, nephridiopore; rh, rhinophore; sh, position of shell; ve, velum. Scale equals 5 mm.

Fig. 3. Dorsal view of the shell. Scale 0.5 mm.

Fig. 4. Spicules of dorsum. Scale 0.1 mm.

Fig. 5. Posterior, lateral radular tooth. (Scales for figs. 5–9 equal 0.05 mm.)

Fig. 6. Posterior, median radular tooth.

Fig. 7. Mandibular denticles.

Fig. 8. A, anterior median radular tooth. B and C, variations in denticulations.

Fig. 9. Anterior, lateral radular tooth.

FIG. 10. The genitalia. Hd, hermaphroditic duct, hg, hermaphroditic gland; ni, nidamental-albumen gland complex; ov, oviduct; pe, penis; pr. prostate gland; sc, spermatocyst; st, spermatotheca; sv, seminal vesicle; va, vagina; vd, vas deferens. Scale equals 1 mm.

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LAND SNAILS OF THE SOUTHERN ATLANTIC COASTAL PLAIN

BY LESLIE HUBRICHT

The land snails of the southern Atlantic Coastal Plain have been less well known than those of any comparable area in eastern North America. There are two reasons for this: first, there have been few collectors there, and second, visitors have not known how to collect in that region.

Because of the humid climate, dead leaves rot rapidly and do not form a deep ground cover in which snails can hide. The

snails crawl at night and burrow into the sandy soil to hide during the daytime. Unless one is able to resort to night collecting it is very difficult to find them in the woods. It is only where man, in his untidiness, has provided shelter that one finds them abundant during the day. Old pasteboard boxes thrown into the woods and the paper behind signboards provide good collecting places. But it is in the towns that one can be most certain of success. Here, under old boards and paper on vacant lots and waste ground, one may find them extremely abundant. I have collected over five hundred snails from the underside of a single old board in such a location.

I should warn the reader of the dangers of collecting in towns. There is a surprisingly large number of people who, instead of satisfying their curiosity by coming to me and asking what I am doing, will call the police. For the most part the police have been pleasant. But there was the time at Courtland, Virginia, when someone told the constable that there was a crazy man loose in the town. The constable rounded up a posse of about ten men before approaching me, in the event I should become violent. At Kinston, North Carolina, a man called the police, and then argued with them for at least fifteen minutes that I was a dangerous character to be securely locked up. He seemed to believe that the pose of snail collector was the favorite disguise of foreign spies. After the police left, he followed me around and carefully jotted down my license number as I drove out of town.

In the present paper, only records for the species which are endemic to the coastal plain, or whose occurrence there is sporadic or little understood, have been cited. The many widely distributed species which occur there have not been listed.

Helix aspersa (Müller)

Virginia: Norfolk Co.: found on several vacant lots in Norfolk.

Helicella (*Helicopsis*) *striata* (Muller)

Virginia: Norfolk Co.: very common on vacant lots in the older part of Norfolk and on dumps in the suburban areas.

This species was determined by Dr. Fritz Haas.

Polygyra septemvolva volvoxis (Pfr.)

South Carolina: Horry Co.: roadside, Nixon Cross Roads, 3 miles southwest of Little River. Georgetown Co.: near Pee Dee River, Georgetown. Charleston Co.: near Cooper River, west of Mt. Pleasant; near Cooper River, north of Lee Street, Charleston.

On Sullivan's Island, South Carolina, where Mr. Ralph W. Jackson collected a large series of this species, all specimens opened had a well developed internal lamina. Along the Cooper River, about one-third of the shells had either a lamina or a row of small papillae. At Georgetown and near Little River, none of the shells opened showed any trace of an internal lamina. Quite evidently the internal lamina is not a valid specific character, and *P. septemvolva* and *P. cereolus* are one species.

Polygyra postelliana (Bland)

North Carolina: Beaufort Co.: along RR. 1 mile west of Belhaven; Leechville. Pamlico Co.: Vandemere; Hobucken. Carteret Co.: Roe; Sealevel; Davis; Marshalburg; Harkers Island; Atlantic Beach; Newport; western edge of Morehead City. Onslow Co.: Swansboro. Columbus Co.: under logs, 3.2 miles northwest of Ash.

Some of the lots recorded above could be referred to *P. p. carolina* Pilsbry, but since most large lots show complete intergradation, an attempt to maintain that subspecies seems impratical.

Stenotrema barbatum (Clapp)

North Carolina: Nash Co.: swamp along Tar River, west of Rocky Mount. Chowan Co.: Edenton. Edgecombe Co.: near Tar River, Princeville. Pamlico Co.: Minnesott Beach. Bladen Co.: Cape Fear River Bluff, Elizabethtown. Johnston Co.: near Neuse River, Smithfield.

Mesodon appressa f. *sculptior* (Chadwick)

Virginia: Norfolk Co.: waste ground, Norfolk.

Mesodon appressa f. *laevior* Pilsbry

North Carolina: Pamlico Co.: Vandemere. Carteret Co.: Atlantic. Sampson Co.: Clinton.

Mesodon perigraptus (Pilsbry)

South Carolina: Horry Co.: 1 mile east of Conway. Darlington Co.: Darlington. Lee Co.: Bishopville. Georgetown Co.: Georgetown.

Triodopsis juxtidens (Pilsbry)

Virginia: York Co.: Yorktown. Elizabeth City Co.: Fox Hill. Nansemond Co.: cane-brake, 0.5 mile west of Driver; just east of Suffolk. Norfolk Co.: Norfolk; South Norfolk. Princess Anne Co.: 1 mile northwest of Herberts. North Carolina: Hertford Co.: Winton. Nash Co.: Rocky Mount. Edgecombe Co.: near Tar River, Princeville. Pamlico Co.: Minnesott Beach. Cumberland Co.: Fayetteville. Bladen Co.: Cape Fear River bluff, Elizabethtown.

At a number of localities in western Virginia and North Carolina, *T. juxtidens* has been found associated with *T. tridentata* and was readily separated. I believe it to be a distinct species, and not a subspecies of *T. tridentata* as originally described.

Triodopsis fallax (Say)

Virginia: York Co.: Yorktown. New Kent Co.: Providence Forge. Sussex Co.: Wakefield. Southampton Co.: Franklin; Courtland. North Carolina: Gates Co.: pinewoods, 2 miles southeast of Roduco. South Carolina: Sumter Co.: Stateburg.

Over most of North Carolina, *T. fallax* is found only in the Piedmont, but near the Virginia line its range moves eastward onto the Coastal Plain. In Virginia it is found as far east as the Miocene Escarpment.

Specimens from Stateburg, South Carolina, have the internal tubercle on the columella, characteristic of *T. fallax*, but show evidence of admixture with *T. vannostrandi* in the large number of closely coiled whorls, and in the angular periphery of some specimens.

Triodopsis vannostrandi (Bland)

South Carolina: Richland Co.: Columbia. Lexington Co.: West Columbia; Lexington; lumber yard, Batesburg. Calhoun Co.: Fort Motte; St. Matthews. Orangeburg Co.: Orangeburg;

North. Aiken Co.: vacant lot, east side of Aiken; just west of Aiken; along RR., Warrenville. Barnwell Co.: Williston. Bamberg Co.: Denmark; Bamberg. Dorchester Co.: St. George. Allendale Co.: Allendale. GEORGIA: Richmond Co.: vacant lot, 1448 North Reynolds St., Augusta.

T. vannostrandi intergrades completely with *T. hopetonensis.* But this intergradation appears to be the result of extensive hybridization rather than being the gradient between two subspecies. The purest *vannostrandi* lot is probably that from Allendale. These are large, high spired, with 6 to 6½ whorls. A number of specimens have the angular periphery of *goniosoma*, which should probably be treated as a form rather than as a subspecies. Other lots, notably those from Augusta, Columbia, Denmark, and the east side of Aiken, are small, low spired, with 5 to 5½ whorls. They differ from *T. hopetonensis* only in having the rib striae a little courser, the umbilicus a little smaller, and the teeth a little heavier, but they would undoubtedly be classified as *hopetonensis* if considered by themselves. A number of specimens from Denmark have the angular periphery of *goniosoma.* Some other lots are intermediate, notably those from Batesburg, where the complete range of intergrades occur together.

Triodopsis hopetonensis (Shuttleworth)

VIRGINIA: Nansemond Co.: marsh, along Nansemond River, Suffolk. Norfolk Co.: Norfolk; South Norfolk; Deep Creek. Princess Anne Co.: Ocean Park. NORTH CAROLINA: Currituck Co.: Moyock; Point Harbor; Coinjock; Poplar Branch; Powells Point; Currituck; swamp, 3 miles southeast of Shawboro. Camden Co.: South Mills; Old Trap; Camden; Shiloh; bank of Pasquotank River, 3.3 miles southwest of Camden. Pasquotank Co.: Elizabeth City. Perquimans Co.: Hertford; Winfall. Hertford Co.: Ahoskie. Bertie Co.: Windsor. Pitt Co.: Bethel; near Greenville. Martin Co.: Williamston; Robersonville. Wayne Co.: Goldsboro; Mount Olive. Lenoir Co.: Kinston. Duplin Co.: Wallace. Onslow Co.: Swansboro; Jacksonville; Kellum; Richlands. Jones Co.: Pollocksville. Pender Co.: swamp, 13.5 miles northeast of Burgaw; Hempstead. Bladen Co.: Elizabethtown. Scotland Co.: Laurinburg. Columbus Co.: Tabor City. Brunswick Co.: Seaside; Southport, near Shallotte; Woodburn. SOUTH CAROLINA: Horry Co.: Conway; Crescent Beach; Myrtle Beach; Little River; Cherry Grove Beach. Sum-

ter Co.: Sumter. Darlington Co.: Darlington. Georgetown Co.: Georgetown. Williamsburg Co.: Kingstree. Berkeley Co.: near Moncks Corner. Colleton Co., near Canadys; Ashepoo. Richland Co.: Columbia.

In North Carolina, *T. hopetonensis* is found over the entire Coastal Plain except the three peninsulas between Albemarle Sound and Beaufort. Near the Virginia line, its western limit moves eastward, and in Virginia it is found only on the Pleistocene land east of the Miocene Escarpment. It apparently does not occur north of the James River.

Triodopsis messana Hubricht

MARYLAND: Wicomico Co.: Nanticoke. Somerset Co.: Chance; Princess Anne. NORTH CAROLINA: Gates Co.: Sunbury. Halifax Co.: Hobgood. Wilson Co.: Stantonsburg. Nash Co.: Rocky Mount. Lenoir Co.: La Grange. Craven Co.: 4 miles east of Dover. Sampson Co.: Roseboro; Clinton. Hoke Co.: Raeford. Robeson Co.: roadside, 1.4 miles northwest of Allenton; Red Springs; Fairmont; Pembroke. Bladen Co.: Clarkton; dump, 1.8 miles west of White Lake; Bladenboro. Columbus Co.: Chadbourn; Fair Bluff; Hallsboro. Brunswick Co.: roadside, 2.4 miles northwest of Ash. SOUTH CAROLINA: Dillon Co.: Lake View. Marion Co.: Mullins. Horry Co.: edge of swamp, 8 miles north of Cool Spring; roadside, 3 miles southwest of Little River; Loris; Homewood. Kershaw Co.: Clio.

Additional records will be found with the original description in The Nautilus, *65:* 80.

Like *T. hopetonensis, T. messana* in North Carolina is found over most of the Coastal Plain, but in Virginia and Maryland it is found only on Pleistocene land. In South Carolina, it apparently does not occur south of the Santee River.

At Clarkton, North Carolina, there is a form in which the lip teeth are well developed but the parietal tooth is absent.

Triodopsis obsoleta (Pils.)

MARYLAND: Somerset Co.: Crisfield; near Pocomoke River, opposite Pokomoke City. Worcester Co.: Public Landing, 1.5 miles southeast of Spence; Snow Hill; roadside, 2 miles east of Stockton. VIRGINIA: Accomac Co.: Chincoteague; Saxis; Hallwood; Onancock; Wachapreague. Northampton Co.: Harbor-

ton; Willis Wharf; Bridgeton; Cheriton; Cape Charles; Brighton. King William Co.: near Pamunkey River, West Point. Norfolk Co.: vacant lots, May Ave., and West Olney Rd., Norfolk; South Norfolk. North Carolina: Hertford Co.: Winton. Perquimans Co.: Hertford. Chowan Co.: Edenton. Dare Co.: Wanchese; Manteo; beach, 3.6 miles south of Nags Head; East Lake; Manns Harbor; Stumpy Point. Tyrrell Co.: Columbia; edge of swamp, 3.5 miles west of Columbia. Washington Co.: Plymouth; swamp, 1.3 miles east of Plymouth. Martin Co.: Williamston. Beaufort Co.: edge of swamp, 2.5 miles northeast of Chocowinity; Belhaven; Swan Quarter. Craven Co.: New Bern; James City. Pamlico Co.: Mesic; Bayboro; Grantsboro; Stonewall; Hobucken; Oriental; Vandemere. Carteret Co.: Roe; Atlantic; Sealevel; Davis; Harkers Island; Marshallberg; Morehead City; Atlantic Beach; Newport. Jones Co.: Trenton. Onslow Co.: Swansboro. Sampson Co.: Clinton. Brunswick Co.: Shallotte; Village Point.

Sinistral specimens were found at Vandemere, Newport, and Swansboro, North Carolina.

With one exception (Clinton, North Carolina, where it is probably introduced), all the records for *T. obsoleta* are from Pleistocene land. It is abundant on the three peninsulas between Albemarle Sound and Beaufort.

Early in my collecting of this species, I noted that it was surprisingly uniform with practically no intergradation to *T. hopetonensis*. Occasionally I would find a specimen in which the lip teeth were overdeveloped until they were of the size of those of *T. hopetonensis*, but these seemed to be more of the nature of freaks rather than intergrades. That is, there were occasional intermediate specimens but never intermediate colonies. Not until my collecting program was nearing completion, at Swansboro, North Carolina, did I find *T. obsoleta* abundant on the marshy ground along the Whiteoak River, while on the slope in back *T. hopetonensis* was found. For the most part, the two forms occupied separate areas, but at one place they occurred together. Here they could be sorted readily. There was no hybridization or intergradation. *T. obsoleta* differed from *T. hopetonensis* in being larger, with a lower spire, larger umbilicus, and a lighter colored shell, the shell color alone being different enough to separate 95% of the specimens. Here was proof that *T. obsoleta* was not a subspecies of *T. hopetonensis* as

it has been originally described, but a distinct species. Its true relationships were discovered later at Clinton, North Carolina.

At Clinton, North Carolina, in a vacant lot, fine large specimens of *T. obsoleta* were found abundant. Two blocks away along a railroad *T. messana* was likewise abundant. On a vacant lot, in the intervening block, was found a complete admixture of the two species. None of the specimens could be called pure *T. obsoleta,* or *T. messana,* but represented varying degrees of intermediacy. Here the two species had met and hybridized, showing that *T. obsoleta,* although looking like a *T. hopetonensis* with reduced teeth, is very closely related to *T. messana.*

At Cheriton, Virginia, *T. obsoleta* is quite typical, with very small teeth and large umbilicus. But at most of the other localities on the Delmarva Peninsula, it has the small umbilicus and larger teeth of the form described as *T. hopetonensis chincoteaguensis* (Pils.). This variation is all in the direction of *T. messana.* In Maryland, *T. messana* likewise shows variation in the direction of *T. obsoleta.* Quite probably at one time there was considerable hybridization between these two species in this area.

On the same day in December, a series of specimens of *T. obsoleta* from two localities and specimens of *T. hopetonensis* from two other localities were examined anatomically. In all the specimens of *T. obsoleta,* the penis was fully developed, but in the specimens of *T. hopetonensis* all had the penis very small and immature in appearance. This suggests that a factor in the reproductive isolation of these two species may be a difference in breeding season.

In Richmond, Virginia, where *T. obsoleta* has been introduced, it has hybridized freely with *T. fallax* (Say). Many of the resultant progeny are not distinguishable from *T. hopetonensis.*

Triodopsis soelneri (J. B. Henderson)

North Carolina: Bladen Co.: Bladenboro. (For additional records see The Nautilus, *64:* 67.)

In the Baldenboro specimens, the outer lip tooth is more strongly developed than in any other specimens.

T. soelneri has been found both with *T. hopetonensis* and *T. messana* and there was no hybridization.

A few years ago a canal was dug through the swamp on the north shore of Lake Waccamaw about three hundred yards back from the lake shore. The earth removed was used to fill in the swamp between the canal and the edge of the lake. This land was then subdivided and sold as cottage sites. This operation covered up most of the colony of *T. soelneri*, but on a few of the vacant sites there were small holes where the original surface had not been covered. In these places they were abundant and I was able to collect a good series. But when cottages have been built on these sites, and the earth has been smoothed out and sown to lawn, the type colony of *T. soelneri* will be extinct.

Triodopsis denotata (Fér.)

North Carolina: Bladen Co.: Cape Fear River bluff, Elizabethtown. South Carolina: Darlington Co.: flood-plain of Pee Dee River, 3 miles east of Mechanicsville. Berkeley Co.: floodplain of Santee River, 5.5 miles northwest of St. Stephen.

Rumina decollata (L.)

North Carolina: Lenoir Co.: waste ground, Spring Hill & South Heritage St., Kinston. Brunswick Co.: Southport. South Carolina: Richland Co.: Columbia. Lexington Co.: West Columbia. Aiken Co.: Aiken.

Opeas pyrgula Schmacker & Boettger

North Carolina: Lenoir Co.: Kinston.

Mesomphix pilsbryi (Clapp)

South Carolina: Darlington Co.: Darlington. Richland Co.: Columbia.

Retinella cryptomphala solida H. B. Baker

North Carolina: Craven Co.: along RR., 4 miles east of Dover. Sampson Co.: Roseboro. Bladen Co.: dump, 1.8 miles west of White Lake. Brunswick Co.: roadside, 2.4 miles northwest of Ash. South Carolina: Horry Co.: roadside, 3 miles southwest of Little River; Homewood; Myrtle Beach.

Ventridens cerinoideus (Anthony)

Virginia: York Co.: Yorktown; Seaford. Warwick Co.: Warwick. Sussex Co.: Wakefield. Southampton Co.: Courtland. Nansemond Co.: just east of Suffolk. Norfolk Co.: swamp along Northwest River, 2 miles south-southwest of Cornland; 1 mile south of South Norfolk; edge of swamp, 3 miles south of North Landing. North Carolina: Currituck Co.: Moyock; swamp, 3 miles southeast of Shawboro. Camden Co.: Camden; South Mills. Pasquotank Co.: marsh, Knobbs Creek, 1 mile north of Elizabeth City. Northampton Co.: Jackson. Halifax Co.: Hobgood. Washington Co.: Plymouth; swamp, 1.3 miles east of Plymouth. Dare Co.: Manns Harbor. Pitt Co.: roadside, 2 miles southwest of Greenville. Beaufort Co.: edge of swamp, 2.5 miles northeast of Chocowinity; along RR., 1 mile west of Belhaven. Craven Co.: along RR., 9.3 miles southeast of Vanceboro; James City; North Harlowe. Lenoir Co.: oak-pine woods, 0.4 mile south of Leflin's Crossroads; roadside, 1.5 miles south of Kinston. Jones Co.: Polocksville; roadside, 2 miles north of Pollocksville. Carteret Co.: Roe; Harkers Island; Marshallberg; western edge of Morehead City; Newport. Wilson Co.: Stantonsburg. Scotland Co.: just east of Laurinburg. Bladen Co.: roadside, Council; Clarkton; White Oak. Pender Co.: roadside, 0.5 mile south of Rocky Point; Hempstead. Hoke Co.: Raeford. Robeson Co.: Fairmont; roadside, 1.4 miles northwest of Allenton. Columbus Co.: under logs, 3.2 miles northwest of Ash; pine woods, 1.3 miles west of Evergreen. Brunswick Co.: swamp, 6 miles northeast of Winnabow; 1.5 miles east of Supply; roadside, 2.8 miles northwest of Ash. South Carolina: Florence Co.: Coward. Marion Co.: Marion. Horry Co.: pine woods, 2.5 miles east of Green Sea; roadside, 3 miles southwest of Little River; edge of swamp, 2.3 miles southeast of Gore Town. Georgetown Co.: Georgetown. Sumter Co.: low woods, Stateburg. Calhoun Co.: St. Matthews. Richland Co.: Columbia.

V. cerinoideus is not strictly a species of the Coastal Plain. It is quite common in the Piedmont of South Carolina.

There is considerable variation in this species. Specimens from the swamps are small, low spired, and with the callous within the lip greatly reduced or wanting. Those from the pine woods are larger, high spired, and with a heavy callous within the lip. The general run of specimens collected in the towns is usually intermediate between these two extremes.

Ventridens ligerus (Say)

Virginia: Southampton Co.: Courtland. Nansemond Co.: near Magnolia. Elizabeth City Co.: Fox Hill. North Carolina: Jones Co.: roadside, 2 miles north of Pollocksville. Bladen Co.: Elizabethtown.

Specimens from near Pollocksville are quite small with the shell pink instead of the usually yellow-green.

Ventridens intertextus (Binney)

South Carolina: Dillon Co.: Lake View. Berkeley Co.: floodplain of Santee River, 5.5 miles northwest of St. Stephen. Richland Co.: Columbia.

Anguispira fergusoni (Bland)

Maryland: Somerset Co.: near Pocomoke River, opposite Pocomoke City. Virginia: Isle of Wight Co.: near river, opposite Franklin. Nansemond Co.: just east of Suffolk. Norfolk Co.: Norfolk. North Carolina: Camden Co.: bank of Pasquotank River, 3.3 miles southwest of Camden. Pasquotank Co.: Elizabeth City. Gates Co.: bank of Chowan River, opposite Winton. Perquimans Co.: Hertford; Winfall. Martin Co.: 1 mile northeast of Williamston; Robersonville. Washington Co.: swamp, 1.3 miles east of Plymouth. Pitt Co.: dump, 1.5 miles north of Greenville. Beaufort Co.: Aurora. Pamlico Co.: Vandemere. Wayne Co.: Goldsboro. Craven Co.: New Bern. Lenoir Co.: Kinston. Carteret Co.: Atlantic. Onslow Co.: Swansboro. Cumberland Co.: Fayetteville. New Hanover Co.: Wilmington. Columbus Co.: north shore of Lake Waccamaw, near Lake Waccamaw Station. South Carolina: Horry Co.: 1 mile east of Conway. Richland Co.: Columbia.

At Columbia, South Carolina, this species was found associated with *A. crassa* under the same log and the two species could be separated without difficulty.

Anguispira alternata form *angulata* Pilsbry

Maryland: Worcester Co.: Snow Hill. Virginia: Northampton Co.: near Cape Charles.

Anguispira crassa Walker

South Carolina: Sumter Co.: low woods, Stateburg. Richland Co.: Columbia. Calhoun Co.: Fort Motte; along RR., Creston. Lexington Co.: lumber yard, Batesburg.

Pallifera fosteri F. C. Baker

Maryland: Somerset Co.: near Westover. Virginia: Sussex Co.: Wakefield. Warwick Co.: 1.5 miles northeast of Morrison. Nansemond Co.: cane-brake, 1 mile west of Driver; near Chuckatuck River, just north of Chuckatuck. Norfolk Co.: South Norfolk. Princess Anne Co.: edge of swamp, 1 mile southeast of Thalia. North Carolina: Hyde Co.: 1.3 miles northeast of Engelhard. Beaufort Co.: edge of swamp, 2.5 miles northeast of Chocowinity. South Carolina: Richland Co.: Columbia. Georgia: Screven Co.: Flood-plain of Savannah River, 17 miles northeast of Sylvania.

Quickella, new species?

South Carolina: Colleton Co.: near Edisto River, 1 mile east of Jacksonboro.

Three specimens were collected. The anatomy is similar to that of *Quickella vagans* (Pilsbry) but the shell looks more like that of a small *Oxyloma salleana* (Pfr.) rather than the *Succinia campestris*-like shell of *Q. vagans.*

Gulella bicolor (Hutton)

South Carolina: Charleston Co.: near Cooper River, north of Lee Street, Charleston.

This species was determined by Dr. H. A. Pilsbry.

CONGERIA LEUCOPHAEATA (CONRAD) IN THE HUDSON RIVER

By MORRIS K. JACOBSON

In 1937 (Naut., *50:* 143) Rehder reported the finding of two live specimens of *Congeria leucopheata* (Conrad) in the Hud-

son River at Haverstraw, Rockland County, New York. As he noted, this record constituted "a notable extension of this brackish-water form," since its supposed northernmost limit was given as Chesapeake Bay by C. W. Johnson (List of Marine Moll. of Atlantic Coast, 1934, p. 29).

On September 27, 1952, Mr. Herbert Athearn of Taunton, Massachusetts and the writer found this mussel in moderate numbers on submerged rocks on a beach just south of the New York Trap Rock Company at Haverstraw. The animals were attached by their byssus to the underside of these submerged rocks. On October 12, 1952, with Anthony D'Attilio and Edwin Carswell, we returned to this spot and, since the tide was lower, found larger specimens in similar situations but in somewhat deeper water.

To find out whether *C. leucopheata* was limited only to this locality, we crossed the river by the Bear Mt. Bridge, and at Croton Point Park, almost directly opposite Haverstraw, found good-sized specimens of this shell in overwhelming numbers, fixed to the submerged portions of a diving float that had been hauled on shore for the winter. This habitat was shared by large numbers of the barnacle *Balanus eburneus*. Some fisherman who led us to live specimens attached to a recently retrieved anchor, told us that the mussel had appeared in such large numbers in this area for the first time this year, though they had noticed it occasionally in earlier years.

Two weeks later at Palisades Park, opposite the Yonkers Ferry and not far from the limits of New York City, we again collected some dead shells of *Congeria* on a small sand beach near the picnic grounds. The day was blustery and the waves high, so we did not look with too much care for live specimens. However the state of preservation of the mussel shells was such as to indicate that they had not been brought down from far upstream but had probably lived not far from the spot where they had been collected. Of course, we are interested in determining the uppermost point on the river where *Congeria* appears as well as its nearest approach to the open sea. This we shall do when the weather again permits. Preliminary analyses made by Mr. Arthur Clarke of Boston of the water samples

collected in September and October give 8.2% sea water at Croton Point Park and 6.0% at Haverstraw. At the Palisades Park, the salt is readily perceptible to the taste. In 1929 (Naut., *43:* 34) Baily found in Chesapeake Bay a conglomeration of salt and fresh water organisms. Similarly at the two former localities we found, besides the barnacles already mentioned, fragments of the blue crab (*Callinectes sapidus* Ordway) and some beach fleas (*Gammarus locusta* Linne ?), in company with dwarfed *Stagnicola palustris* (Müller) and some small gastropods that agree well with the recently discussed *Littoridina tenuipes* (Couper) (Naut., *66:* 50 ff.).

It is hardly likely that *C. leucopheata* has existed undetected in the Hudson River for so many years, defying the efforts of the most indefatigable and skillful collectors to find it. Much more plausible is the possibility that it was more or less recently introduced, possibly by accidental means. At any rate, we have here an interesting counterpart to the disappearance of such southerly forms as *Littorina irrorata* Say, *Nassarius vibex* Say and *Noetia ponderosa* (Say) from our shore in the northeast. In this case, we have a southern form advancing northward and adapting itself with great success. Hence the theory which sees evidence for "a change in the climate for the colder" (Johnsonia, *7*: 7, 1943) in the dying out of *L. irrorata* at the northern edge of its range, may have to be revised.

Johnson (l.c.) used the name *Congeria leucopheata* and gave *Mytilopsis* Conrad 1857 as a synonym of *Congeria* Partsch 1835. Thiele (Handb. d. Weicht., 862–3, 1935) listed *Mytilopsis* [type *D. leucophaeata* (sic) Conrad] as a section of *Congeria* which was a subgenus of *Dreissena*. However, since many of the Thiele subgenera have been accorded generic rank and the sections are generally regarded as subgenera, the name as of now probably is *Congeria* (*Mytilopsis*) *leucopheata* Conrad.

Specimens of the material we collected are in the collections of the above named gentlemen as well as in the United States National Museum, the Museum of Comparative Zoology and the Academy of Natural Sciences of Philadelphia. We will be happy to send specimens to anyone asking for them as long as they last.

REVISED LIST OF MOLLUSKS FROM YORK COUNTY, PENNSYLVANIA

By ROBERT A. HEILMAN and GORDON K. MacMILLAN

York County, Pennsylvania, is a territory not unfamiliar to the malacologist. At various times throughout the history of this part of the state, collectors have obtained mollusks and have reported on that fauna of this county.

Probably the first mention on the fauna of York County was made by S. S. Haldeman. Haldeman, writing in Rupp's "History of Lancaster County" published in 1844, records "*Limnea columella*" from York County.

In 1894, Dr. H. A. Pilsbry's "Critical List of Mollusks collected in the Potomac Valley" listed 32 species collected by Witmer Stone at York Furnace.

Stanley Brooks in 1931 in "A List of the Land Snails of Pennsylvania with a Summary of their Distribution" includes a list of 27 terrestrial species from York County. Of these, 13 species were previously reported by Dr. Pilsbry.

Others who have mentioned the York County fauna are Arnold E. Ortmann (1919), Charles B. Wurtz (1940), and Gordon K. MacMillan (1948).

A compilation of the species reported by these persons gives York County a record of 54 species of which 22 are aquatic and the remaining 32 are terrestrial.

Armed with this known record, the senior author spent the summer of 1952 collecting mollusks throughout York County with the hope of adding new species to the county record and also to determine what change has taken place in the fauna of the county. Collecting was done chiefly in the vicinity of York, York Furnace, New Salem and Zion View.

To the list of shells obtained by the senior author, the junior author has added 13 species and varieties. These specimens were taken from the material incorporated in the unpublished thesis for a Doctor of Philosophy degree by the junior author.

Now that the results of the field trips have been evaluated, evidently York County supports a greater and more varied

fauna than has previously been reported. A total of 35 species and subspecies not previously known in York County has been found. As has also been observed, industrial pollution of the county creeks and of the Susquehanna River is bringing about the extinction of the mussels and the freshwater gastropods.

A revised list of species known from York County follows. Species new to the county fauna are indicated by an asterisk.

Triodopsis tridentata (Say)
T. tridentata juxtidens (Pilsbry)
T. fallax (Say)
T. fraudulenta vulgata Pilsbry*
T. notata (Deshayes)
T. albolabris (Say)
T. albolabris dentatus (Tryon)*
Mesodon thyroides (Say)
Allogona profunda (Say)*
Stenotrema hirsutum (Say)
S. fraternum (Say)
Haplotrema concavum (Say)
Paravitrea multidentata (Binney)*
Ventridens intertextus (Binney)*
V. ligera (Say)
V. suppressus (Say)
V. suppressus virginicus (Vanatta)*
Zonitoides arboreus (Say)
Hawaiia minuscula (Binney)*
Retinella indentata (Say)
R. indentata paucilirata (Morelet)*
R. electrina (Gould)
R. wheatleyi (Bland)*
R. rhoadsi (Pilsbry)*
Striatura milium (Morse)
Omphalina cupreus (Rafinesque)
Limax maximus (Linnaeus)*
L. flavus (Linnaeus)
Deroceras laeve (Mueller)
D. reticulatum (Mueller)*
Anguispira alternata (Say)
A. alternata angulata Pilsbry & Vanatta*
Discus cronkhitei (Newcomb)
D. cronkhitei catskillensis (Pilsbry)*
D. patulus (Deshayes)*
Helicodiscus parallelus (Say)
Philomycus carolinianus flexuolaris Rafinesque
Pallifera dorsalis (Binney)
Succinea avara Say*
S. decampi gouldi (Pilsbry)
S. ovalis Say
S. ovalis optima Pilsbry*
Cionella lubrica (Mueller)*
Pupoides albilabris (Ward)
Gastrocopta armifera (Say)
G. armifera clappi (Sterki)*
G. pentodon (Say)*
G. corticaria (Say)
Vertigo gouldi (Binney)
V. tridentata Wolf
V. ventricosa (Morse)*
Columella edentula (Draparnaud)
Strobilops aenea (Pilsbry)
S. labyrinthica (Say)
Vallonia pulchella (Mueller)*
V. costata (Mueller)*
V. excentrica Sterki
Punctum minutissimum (Lea)*
Pseudosuccinea columella (Say)
Stagnicola caperata (Say)
Fossaria obrussa (Say)*
F. modicella (Say)*
F. parva (Lea)*
Helisoma anceps (Menke)
Helisoma trivolvis (Say)
Gyraulus parvus (Say)
Planorbula jenksii (H. F. Carpenter)
Physa heterostropha (Say)
Ferrissia rivularis (Say)*
Campeloma decisum (Say)
Valvata tricarinata (Say)
V. bicarinata (Say)
Lioplax subcarinata (Say)
Amnicola limosa (Say)
Pomatiopsis lapidaria (Say)*
Goniobasis virginica (Gmelin)
Anculosa carinata (Brug)
Elliptio complanatus (Dillwyn)
Anodonta cataracta (Say)
Alasmidonta undulata (Say)
A. variocosa (Lamarck)
Strophitus rugosus (Swainson)
Lampsilis cariosa (Say)
L. radiata (Gmelin)
Sphaerium sulcatum (Lamarck)*
S. striatinum (Lamarck)*
S. (Musculium) transversum (Say)*
S. (Musculium) partumeium (Say)
S. (Musculium) truncatum (Linsley)*
Pisidium casertanum (Poli)*

FRESH-WATER MUSSELS USED BY ILLINOIAN INDIANS OF THE HOPEWELL CULTURE

By MAX R. MATTESON

University of Illinois, Urbana, Illinois

Much of our knowledge of Indian culture has been obtained through the examination of ancient village sites, mounds, and other structures which were once associated with Indians of past ages. By examining various items such as pottery, cooking utensils of various types, weapons, and the inedible remains of different kinds of food, the ancient cultures of certain Indian groups have been ascertained. Anthropologists have both carefully studied and written about many sites once ococupied by the American Indian. States appearing commonly in the vast accumulation of literature on this subject are Maine, New York, Indiana, Illinois, Arizona, Tennessee, and several others.

Illinois ranks high in the preceding list. The main reason for this fact is that this state was arranged excellently, both geographically and geologically, for the semipermanent residence of many Indians. The flat or gently rolling, highly fertile topography was well suited for agriculture. Many artifacts have been found which were used for cultivating plants. Then, too, the numerous waterways offered excellent opportunity for the navigation of canoes both within Illinois and to distant areas. The Ohio River on the south was navigable for hundreds of miles to the east, while the Mississippi and Missouri Rivers carried both Indians and goods to the north, south and west.

Although relics of Indian origin have been found in most of the counties of Illinois, certain areas have been outstanding in their contributions from these very interesting people. Usually the most important areas have been typified by the presence of mounds of varying shapes, which were mainly used as burial sites. Some of the more important mounds are located near the confluence of the Ohio and Mississippi Rivers, on the lower reaches of Cahokia Creek near East St. Louis, near Peoria, and near Havana. However, former village sites have been excavated in several areas which have contained many utensils and farming implements, with many items of animal origin

having been discovered in the various kitchen middens and refuse heaps. It is interesting to note that all of the larger sites are located near the banks of a stream of considerable size.

On several occasions, suggestions concerning the former distribution of animals have been obtained from the study of bones and other indestructible items of animal origin which were either eaten by, or were closely associated with the Indians of various eras. The analysis of animal remains from Illinois sites has been conducted chiefly by F. C. Baker, who was formerly curator of the University of Illinois Museum of Natural History. In his outstanding papers on this subject (1930, 1931), he has presented a formidable list of fish, birds, mammals and mollusks from various sites in Illinois. He, unlike other authors on the subject, made an attempt to classify the mollusks instead of merely listing them as being present. His lists are mainly qualitative in that they are an inventory of the forms present, without the enumeration of individuals represented by the various species. He found that the food supply of these Indians was significantly augmented by fresh-water mussels. During the excavation of a mound near Havana, Baker observed one kitchen midden of clam shells of such size that its origin was confused as the pile resembled a Pleistocene formation many of which were also found in that area. He also stated that several species of aquatic snails were probably used as food while land snails seemed to be rare in kitchen middens. This is an interesting observation because the author of this paper has obtained large quantities of well preserved land snails which have been taken from village sites recently excavated on the Illinois River. However, he is of the opinion that the land snails crawled onto the exposed mass of a kitchen midden composed mostly of clam shells, found the situation to their liking mainly due to the calcium content of the valves and remained there. Large numbers of them completed their life cycle and thus a large uppermost layer of these land snails were gathered here during the process of excavation. There is an excellent possibility that many terrestrial snails may have found the pile of discarded valves while the village was still being occupied by Indians. However, the author's opinion does not coincide with that of the noted anthropologist, Professor John McGregor of

the University of Illinois, who was in charge of this investigation. He feels that they were gathered and eaten by the Indians. A student of conchology will profit by reading his treatise on this subject as soon as it is published.

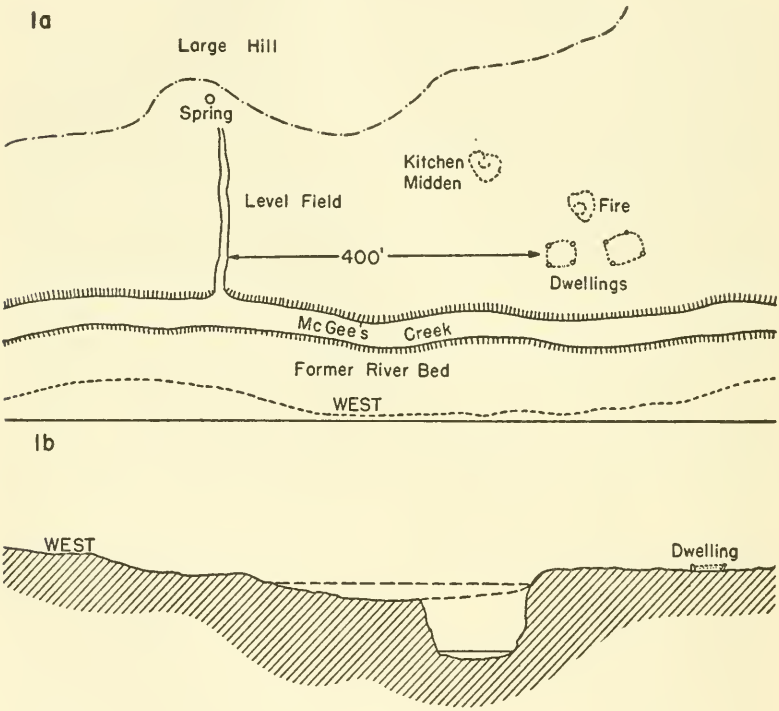

Fig. 1a. Diagram of McGee's Creek adjacent to a former village site occupied by Illinoian Indians in 500 B.C.

Fig. 1b. Cross-section of the basin of McGee's Creek showing its former river bed.

Recently, the author has been the fortunate recipient of a large collection of fresh-water and snail shells which had been removed from kitchen middens. These were presented by Professor McGregor who had uncovered them at several sites along the lower Illinois River, and other sites near Batchtown and Hamburg, Illinois, adjacent to the Mississippi River.

Of the several sites which were included, one seemed of unusual interest. This site, formerly a small village, included a large variety of unionid valves whose environmental demands did not seem to fit the aquatic situation as it exists at the present time. It is located on McGee's Creek, a small tributary of the Illinois River, entering that stream a few miles below and opposite Meredosia which is located in Morgan County. The creek originates near Quincy, Illinois, flows southeastward through a series of hills and then breaks through the bluffs of the Illinois River which are low at this point. It then proceeds several miles along the flood plain of the large river before entering it. The site is located on the Robert Poole farm about two miles before the stream enters the flood plain. A dwelling of considerable size was discovered about forty feet from the bank of the creek (fig. 1a). Also nearby, the remains of several fires which had been used for cooking over a long period of time were unearthed. Dr. McGregor, by means of carbon ^{14} determination, has dated the village's existence as being about 500 B.C. Many pieces of pottery, beads, artifacts of various nature, and the remains of many animals which had been used as food were found around the buildings and in the trash which had accumulated throughout the small village.

At present, the creek is about twenty feet wide at this point and flows in a channel with almost perpendicular banks which are about fifteen feet in height. The east bank, adjacent to the dwelling, has been subjected to scouring action brought about by many periods of flood over an indefinite span of time to the extent that perhaps, in time, the entire remains of the permanent dwelling may be lost. The author has visited the site in early spring when the waters of the creek had left the present stream bed and were flowing through the nearby forest. However, the village site which is fortunately on higher ground was several feet above water.

One of the first indications that a village might have existed at this location was the plowing up of several unionid valves by Mr. Poole. Later, Dr. McGregor investigated the spot where they were found. He immediately discovered that a large accumulation of valves had been discarded by the Indians so that a kitchen midden of large size had been formed which extended

into the earth for a distance of several feet. Although the compact mass of mussel valves was quite free from soil, dispersed among them were individual beads, broken artifacts, and other items which were no longer of value to the Indians. No shells of aquatic snails were found, which may imply that they were not eaten, at least by these Indians. As most of the mussel valves exhibited various stages of disintegration, there is a

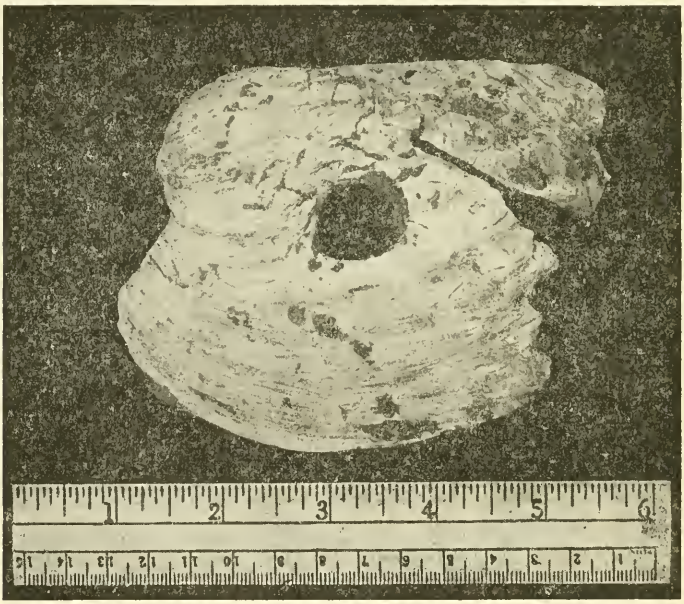

Fig. 2. Valve of *Megalonaias gigantea* which was used as a hoe. The tip of the hoe (posterior end) was broken.

chance that the relatively frail shells of aquatic snails might have been decomposed. Many valves were represented only by the umbonal area or by some other fragment of the original shell. In all, the periostracum had been lost and upon the slightest exertion of pressure the outer layers of nacre falls apart. Many terrestrial snails were found. Although they were more concentrated at the top of the kitchen midden, there were shells present at all levels. Most of them are excellently preserved. On many, the color-patterns are still clearly in evi-

dence and the lips are unbroken. One artifact, a hoe (fig. 2), was made by boring a hole through the disc of a valve and then chipping off a portion of the anterior end so that it would fit the right hand of the user. The index finger would be inserted in the hole.

Although the unionid valves were in various stages of disintegration, most of them could be identified with surprising ease. There are several structures on a valve which are constant, or almost so, for any given species of mussel. Usually, when one of these was obliterated, those which remained were sufficient for accurate identification. Often small fragments were identifiable by the presence of a single key characteristic.

In the following inventory of the fresh-water mussels obtained at the site, the numbers in parentheses represent specimens which were measurable; when two numbers are given, the first refers to length and the second to height. The numbers collected (and measured) are followed by mean lengths and heights, unless otherwise indicated.

Actinonaias carinata. 64 (39), 7.9 × 4.7 cm. Uniformly small; posterior tips usually lost.

Actinonaias ellipsiformis. 17 (10), 4.9 × 2.9 cm. Very common in headwaters; occasionally in small rivers.

Amblema costata. 37 (15, 21), 6.6 × 4.9 cm. Small, as is typical in small rivers.

Amblema peruviana. 28 (14, 18), 6.8 × 4.8 cm. Comparatively small.

Amblema rariplicata. 5 (4, 5), 7.5 × 5.4 cm. Comparatively small.

Elliptio crassidens. 9 (2, 3), 9.6 × 5.9 cm. No record of presence in Illinois during historical times.

Elliptio dilatatus. 40 (39), length 7.1 cm. Species is typical of small rivers (form *delicatus*).

Fusconaia ebenus. 9 (9), 5.2 × 5.8 cm. Much smaller than those found in large rivers.

Fusconaia flava. 12 (10), 4.2 × 3.2 cm. Species and size typical of small rivers.

Lampsilis anodontoides. 1 (1), height 5.2 cm. Usually found in bottom composed of coarse sand.

Lampsilis siliquoidea. 50 (42), 7.3 × 4.0 cm. Small; both lake and river forms present.

Lampsilis ventricosa. 36 (26), 8.9 × 6.0 cm. Small, as is found in small rivers; valves rounded.

Lasmigona costata. 5. Only umbonal areas found; lives in many environments.

Ligumia recta. 11 (3), 9.8 × 4.1 cm. Usually lives in gravel or sand in clear water.

Megalonaias gigantea. 3. Two were artifacts; species lives only in large rivers.

Micromya iris. 3 (3), 4.6 × 2.5 cm. Very common in headwaters; occasionally in small rivers.

Pleurobema coccineum. 26 (19), 5.2 × 3.8 cm. Small, as is typical of small rivers; prefers gravel bottom.

Pleurobema pyramidatum. 3 (2), 5.6 × 6.6 cm. Occurs in large rivers or nearby in tributaries.

Quadrula pustulosa. 5 (5), 4.3 × 4.2 cm. Small, as in small rivers; prefers gravel bottom.

Strophitus rugosus. 1. Umbo only; sole representative of thin shelled forms.

Tritogonia verrucosa. 2 (2), 9.9 × 5.4 cm. Lives in large and small rivers; prefers gravel bottom.

As will be observed, many of the mussels listed are typical residents of small or medium-sized rivers. Others can live in either large or small rivers, but if they occupy the latter their size becomes diminished. Often, other features of shells may become altered during their transmission from larger rivers to smaller streams (Ortmann, van der Schalie). There is no definite explanation for this phenomenon. Certain taxonomists have gone to the extent of establishing subspecies for several of those forms which occur in both large and small rivers.

Two forms which are typical of headwaters are represented in the list. *Actinonaias ellipsiformis* and *Micromya iris* have been collected in large numbers from the extreme headwaters of several rivers in Illinois. However, they may be found occasionally farther down these streams where small-river conditions prevail. There is a definite tendency for an increase in size in the latter environment. A small river may arbitrarily be described as being approximately 30 feet wide with a maximum depth of three or four feet during periods of normal water level.

Those forms in the list which are most typical of small rivers are *Amblema costata, Elliptio dilatatus, Fusconaia flava* and *Pleurobema coccineum.* In all these forms, certain variations in the shell are noticeable. The advisability of creating subspecies

where these slight differences occur within a species is problematic. Baker (1928) would identify some of the individuals listed here as *E. dilatatus delicatus.*

The forms *Actinonaias carinata, Amblema peruviana, Amblema rariplicata, Fusconaia ebenus, Lampsilis ventricosa* and *Pleurobema pyramidatum* are usually described as being found in large rivers. However, these species, or so-called subspecies of them, may be found in a small-river environment, often in large numbers. When this situation occurs, the individuals become reduced in size and the ratios between length, height and width of shell may change. The latter phenomenon has been emphasized by Ortmann. Probably Baker (1928) would take strong exception to the possibility that these forms are found in a small river.

Decrease in size which accompanies the entrance of most large-river species into a small-river environment is well illustrated by *F. ebenus.* The means for length and height of the nine specimens which were found at the site were 5.2 and 5.8 centimeters respectively. The means for the same measurements of 134 specimens which were taken from a site near Batchtown, Illinois, adjacent to the Mississippi River were 5.8 and 7.7 centimeters respectively. The valves of *L. ventricosa* were observed to be uniformly small and delicate when compared with those from large rivers and were unusual in that they presented few differences in general shape which is highly variable in this species.

Indications show that the valves of *Megalonaias gigantea* were carried to the site from either the Illinois or Mississippi Rivers. As the hoes of the primitive Indians, who formerly occupied the village, were usually made from this species, the three valves which were found could have been secured at any point on these rivers where they existed. As today, this species then probably occupied only the largest rivers.

The other species mentioned in the chart occupy either large or small rivers. As is interesting to note, *Elliptio crassidens* has not been found in Illinois during the present era. However, Baker (1928) states that it has been found in several Pleistocene deposits in northern Illinois. *P. pyramidatum* is said by Baker

(1928) to occupy large rivers but it will enter the smaller tributary streams nearby them. He lists the unionid as *P. coccineum solida* but the author feels that Ortmann and Walker's name (1922) is more accurate.

The umbonal area of a single valve of *Strophitus rugosus* represented the only thin-shelled form which was found in the kitchen midden. The reason for the scarcity of thin-shelled unionids is unknown. Although all the valves were carefully removed from their original positions, there is a chance that the valves of the more fragile forms had already disintegrated. Another assumption might be that the Indians had learned to favor certain species over others as food. And, of course, the thinner-shelled mussels may not have existed near the site. However, it seems impossible that such forms as *Anodonta grandis* and *Anodontoides ferussacianus* were not present. They invariably exist in varying numbers in a community of freshwater mussels when the forms mentioned here are included in the group. Also, one is almost sure to find other thick-shelled mussels in this community, especially *Alasmidonta marginata* and *Lasmigona complanata*. These forms were lacking from the collection. Little debris which might have originated from the deterioration of unionid valves was present in the kitchen midden. From the foregoing facts, it is logical to assume that for reasons unknown at present the Indians selected some forms for their diet and rejected others.

The creek as it exists today does not afford favorable living conditions for most of the mussels which are included in the inventory. As has been stated before, it flows between two relatively high banks over a barren clay bottom. There are no evidences of those aquatic plants or other forms of aquatic life which are usually associated with a small river. The water itself is somewhat turbid and moves rapidly, other than in late summer when the stream becomes only a series of shallow pools. An inventory of the present day unionid fauna reveals that there are two mussels in evidence which typically occupy the headwaters of rivers. *Alasmidonta calceolus* and *Actinonaias ellipsiformis* were found sparingly in the vicinity of the site.

(Concluded in next number)

IMOGENE STRICKLER ROBERTSON

or

(MRS. HAROLD R. ROBERTSON)

(1872–1953)

Our beloved Mrs. Robertson (Genie to most of us) died February 6, 1953. Her untimely death is a great loss to every member of the American Malacological Union, whether they knew her or not, as her long and devoted services as Secretary from the date of its organization April 30, 1931, until 1951 can never be matched. There was only one Genie Robertson.

During Mr. Robertson's long illness she was unable to attend the A.M.U. Meetings with the exception of the one held in Washington in 1946. As Mr. Robertson's death occurred in July, 1951, just a few weeks before the Buffalo meeting, it was quite an emotional effort for her to greet old A.M.U. friends at that time. However she was very happy to have the meeting here. As the A.M.U. was very dear to her heart, she valiantly proceeded to supervise the preparations for that meeting, which was the last one she attended. As is pleasant to recall, the host in 1951 was the Museum where she had worked faithfully and happily for many years.

Mrs. Robertson was a member of an old South Buffalo family. From the age of three until her death she had lived at 136 Buffum Street. She is survived by two sons, Clarence P. Robertson and Ralph A. Robertson, both of Buffalo; two daughters, Mrs. Walter McCausland of Buffalo and Mrs. J. Gordon Petrie of Grand Junction, Colorado.

Mrs. Robertson gave freely of her time to those who consulted her on scientific problems. She carried on a wide correspondence with many people whom she had never met and those who have had this privilege must have derived much pleasure and benefit from their contact with her.

She served as Secretary of the Buffalo Naturalists Field Club; Secretary of the Microscopical Section of the Buffalo Society of

Natural Sciences from June 1920 when this group was organized, until October, 1947; Secretary of the Conchological Section from 1918 to 1936, and as President of that Section until her death. She was Curator of Conchology and later Associate in Malacology; Curator of Biology; Science Editor and Registrar as well as Librarian of the Museum's collection of microscopical slides.

Mrs. Robertson was co-author with the late Clifford L. Blakeslee of "The Mollusca of the Niagara Frontier Region," the Bulletin of the Society of Natural Sciences, Volume 19, Number 3, Buffalo, 1948.

In looking through some of her files, her daughter, Mrs. McCausland, and I have found papers on widely diversified subjects, which no doubt were written for the numerous groups of which she was a member. A few of the papers are: "Conchology in Buffalo"; "Some Minute Mollusks of the Niagara Frontier"; "What About Slugs"; "Molluscan Jaws"; and many more on conchology; "What I found on a Sycamore Tree"; "Furs and Feathers"; "Plant Hairs"; "Opals with the Microscope," and the last article she wrote was "Once an Indian Village," a brief sketch of the historical background of the surroundings which so long had been familiar to her.

In checking records at the Museum, I find that for "Hobbies" (the magazine of the B.S.N.S.) she had written approximately sixty-five articles. She retired from the Museum in 1942, and until her death was Research Associate in Malacology.

Fossil shells were among some of Mrs. Robertson's childhood playthings as their house was built on a limestone ledge and the rocks blasted out in making the excavation for the cellar were rich in fossils. The only mollusk named for her is a cephalopod, *Tylorthoceras robertsonae* Flower, which in 1912 she found practically on her own back doorstep. This fossil shell is in the Buffalo Museum, as is also the entire Robertson shell collection.

Fond memories of Genie Robertson will remain forever with those who knew her well.—Margaret M. Teare.

This versatile woman left not one empty space but several. A devoted mother, she is sadly missed by her bereft family. Her passing is felt keenly by all the church of which she was a life-

long member. Scientifically, literally hundreds of persons came to love this friendly woman, who gave patient and detailed attention to their requests for information or advice. An old friend once said: "Genie had a head start, for she was born with dimples, a tranquil disposition, and an inquiring mind."

In 1903, Imogene Christobel Strickler married Harold Ralph Robertson. Together they started and built a magnificent collection of shells, another of minerals.

In later years, Mrs. Robertson became an authority on the culture of the Indians of western New York, and her last published work was a history of the old burying ground, now a city park, across from her home. The second installment appeared in the same number of a neighborhood newspaper which announced her death.

As secretary of the A. M. U., Imogene carved for herself a lasting niche in the hearts of her fellows, for she was unfailing in what she considered the greatest of her duties, that of affording every encouragement to any person who sought her aid. She saw the Union double in size, and no small factor in that growth was the patient effort, which did not feel that her duties stopped with the mailing of announcements and form letters.

She made no claim to being other than an amateur, never named a species, and preferred rather to serve science by administering to the needs of other scientists. Appreciation of this attitude is expressed in a letter, written by one who often benefited from her kindness: "She was an inspiration to many collectors, amateur and professional. Perhaps our loss can be tempered with the thought that when some of us finally take passage across the River Styx, we shall forever be condemned to sit and identify the species we have described, while Mrs. Robertson will be free to wander over sunny Elysian meadows and gather in quantity the rarest and most beautiful of mollusks. May I join her friends and fellow club members in wishing her happy hunting."

And so say we all. Good shelling, Imogene!—MARGARET C. TESKEY.[1]

[1] A few excerpts from a fine biography. Mrs. Teskey also furnished the photograph for the frontispiece of this number.—H. B. B.

NOTES AND NEWS

The Eighth Annual Shell Show of the St. Petersburg, Florida, Shell Club was held in the Rod and Gun Club house on Lake Maggiore, February 19 to 26. The Smithsonian Award for the best collection, a handsome framed, lithographic plate of shells in color, was given to Mr. and Mrs. Myron P. Van Woert. Their exhibit comprised a collection of Florida sea shells, and an extensive general collection arranged to show classification of Mollusca down to genera. The numerous species were all named, and genotypes present were indicated.

So many of the exhibits were of high merit that, short of describing them all, selection of any for special mention would be difficult. They comprised local and Florida collections, deep water shells of the Gulf, exhibits of single families, such Haliotidae, Volutidae, Muricidae and poison *Conus*, also shells adapted to decorative purposes, engraved shells, cameos, and many others. Mention may also be made that an Award of Merit was given to a boy of ten, Berry J. Weckesser, for the best collection by juniors under 14 years of age. The salt water aquarium of James Kelley, Jr., also received an Award.—H. A. P.

Another specimen of Fastigiella carinata Reeve.—You may be interested to know that we have a specimen of this rare shell, almost identical with that collected by Mr. Ostheimer, which we have seen. Ours was taken last July at Powell's Point, Eleuthera, Bahamas. It is a crab shell, 39 mm. long, and was found in about four feet depth at low tide.—George F. Kline (in letter to Ed.).

Note on Mesodon andrewsae normalis.—In Pilsbry's Land Mollusca of N. A., vol. 1, p. 720, the locality "North Carolina: Ben Creek Experimental Forest, Walnut Cove, Stokes Co. (A. P. Jacot)" for *Mesodon andrewsae normalis* (Pils.) is cited. This record seemed questionable to me and I set out to check it. I made numerous inquiries in Stokes Co., N. C., but could not find anyone who knew of any experimental forest in that area. On my last visit to Philadelphia, I examined the specimen. Although it is dead and somewhat deformed, it was undoubtedly *M. a. normalis*. The label, however, gave the lo-

cality as "Bent Creek" rather than Ben Creek. On the U. S. G. S. topographic map of the Dunmore Mtn. N. C. quadrangle, in Buncombe Co., was an area marked "Bent Creek Experimental Forest." I believe this to be the true locality for this specimen, and that in some way the data on the label became mixed.—LESLIE HUBRICHT.

PUBLICATIONS RECEIVED

MARINE MOLLUSCA OF THE EASTERN COAST OF NORTH AMERICA: THEIR NAMES AND MEANINGS. By Henry Poirier. 167 pp., mimeographed. 1952. Roger Bretet, $5.25.—This checklist, with the derivation or meanings of the names of taxonomic groups from classes to subspecies, contains the species in Johnson's "List of marine Mollusca of the Atlantic Coast" plus many described since, making 2915 in all. It shows careful study and should be very useful to collectors and students. A few of the derivations are translated too literally; for examples, *Rissoella* and *Rissoina* were founded on *Rissoa,* and only indirectly "Named for Risso," and *Phenacolepas* (Phenacolepadidae) probably connoted a false (not s.s.) lepas rather than "a deceptive limpet."—H. B. B.

METHODS AND PRINCIPLES OF SYSTEMATIC ZOOLOGY. By Ernst Mayr, E. Gorton Linsley and Robert L. Usinger. 328 pp. 1953. McGraw-Hill, $6.00.—This text and reference book is divided into 3 parts: "Categories" and concepts (59 pp.), with chapters on taxonomy, the species and its subdivisions, and higher groups in classification; Procedure (115 pp.), with 6 chapters on methods, and Nomenclature (84 pp.), with 8 chapters which include discussions of the international rules and proposals for the future. The work also includes a bibliography (15 pp.), a glossary of technical terms (16 pp.) and an index. The book should be very useful, at least as a focus for discussion. Naturally it mainly emphasizes the ornithologic and entomologic viewpoints, with their accentuation of the species.—H. B. B.

EINFÜHRUNG IN DIE BIOTAXONOMIE. By F. A. Schilder. 1952. 162 pp. Gustav Fischer, 13.50 DM.—This introduction

to bio-taxonomy, which in the author's semantics means the "Formenkreis" ideology, after a synopsis of general taxonomy (15 pp.), definitions of distribution (6 pp.), discussions of the "Formenkreis" or superspecies (19 pp.) and generalizations on morphologic parallelism (4 pp.), illustrates the ideas with examples from the literature, which understandingly are not arranged in the same categories, since taxonomic groups seldom agree with any one generality. The first and many subsequent examples are Cypraeidae, which are claimed to represent the best research on marine mollusks. The 123 text figures, founded on these examples, mainly superimpose diagrams on rather vague outline maps; like most of Dr. Schilder's contrivances, they are highly ingenuous but often somewhat puzzling. This little book is a very useful concentration of many widely dispersed (although mainly European) taxonomic publications. —H. B. B.

A HISTORICAL REVIEW OF THE MOLLUSKS OF LINNAEUS. Part 1. The classes Loricata and Pelecypoda. By Henry Dodge. 1953. Bull. American Mus. Nat. Hist., vol. 100, art. 1, 263 pp. $4.00. —This is an exhaustive series of studies on the Linnean genera and species. Each identifiable species is traced to its modern systematic position, and a characteristic figure is cited. Without too much emphasis on the Linnean collection, studied by Hanley, or on the figures cited by Linné in his synonymies, Dodge makes a careful attempt to identify each species in its original description, which is quoted. The type of each of Linné's genera and of each subsequent group, of which any of his species has become the type, is discussed. Besides providing very interesting reading from its historic aspects, this work will be extremely useful to all students of these difficult problems of nomenclature.—H. B. B.

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Compiled by Aurèle La Rocque

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